



IMECE[®]

ONE GREAT LEARNING EXPERIENCE.
INTERNATIONAL MECHANICAL ENGINEERING
CONGRESS & EXPOSITION [®]

CONFERENCE
Nov 9 – 15, 2018

EXHIBITION
Nov 11 – 14, 2018

David L. Lawrence Convention Center, Pittsburgh, PA

Program



The American Society of Mechanical Engineers[®]
ASME[®]

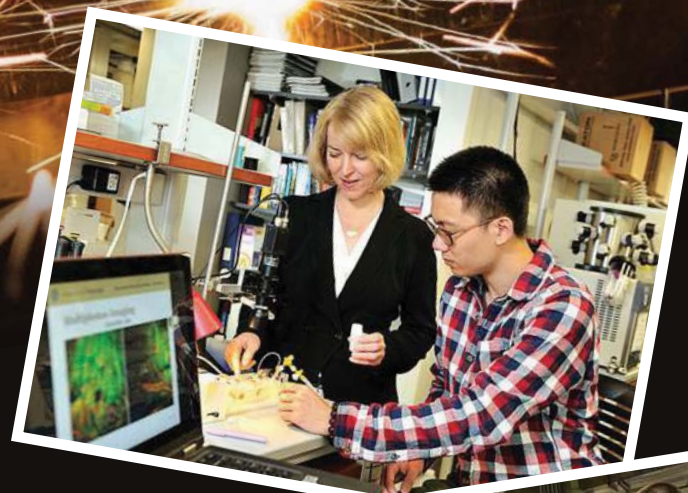
ASME
SETTING THE STANDARD

CELEBRATING 150 YEARS OF ENGINEERING EXCELLENCE

Since the founding of the mechanical engineering program at the University of Pittsburgh in 1868, the Department of Mechanical Engineering and Materials Science has built a strong reputation for academic excellence, innovation and advancing research.

Core research competencies in the MEMS Department at Pitt include:

- Advanced Manufacturing and Design
- Biomechanics and Medical Technologies
- Energy System Technologies
- Materials for Extreme Conditions
- Modeling and Simulation
- Quantitative and In Situ Materials Characterization



Degree programs (with a nearly 100 percent placement rate):

- Materials Science and Engineering (BS, MS, PhD)
- Mechanical Engineering (BS, MS, PhD)
- Nuclear Engineering (BS, MS)
- Engineering Sciences (BS)
- Certificates in: Nuclear Engineering; Simulation in Design; and Processing, Properties, and Performance of Engineering Metals
- Graduate Certificate in Nuclear Engineering is also offered online

CITY OF PITTSBURGH

OFFICE OF THE MAYOR

A Proclamation

IMECE WEEK

November 9 - 15, 2018

WHEREAS, presented by the American Society of Mechanical Engineers (ASME), the **International Mechanical Engineering Congress and Exposition (IMECE)** is the world's largest interdisciplinary mechanical engineering conference; and

WHEREAS, **IMECE** will hold more than 470 sessions on 16 technical tracks exploring advanced manufacturing; advances in aerospace technology; biomedical and biotechnology engineering; engineering education; heat transfer and thermal engineering; dynamics, vibration and control; mechanics of solids, structures and fluids; fluids engineering; design, reliability, safety and risk; micro- and nanosystems engineering and packaging; and acoustics vibration and phononics; and

WHEREAS, **IMECE** will also feature 20 track plenary presentations, 4 special Honoring Symposia commemorating the contributions of 4 distinguished academic leaders; Yehoshua (Shuki) Frostig of the Technion-Israel Institute of Technology, Devdas Pai of North Carolina A&T State University, Kirti (Karman) Ghia of the University of Cincinnati, and ASME Medalist and Honorary Member Frank Kreith, 4 technical tours (Carnegie Mellon University Laboratory, University of Pittsburgh Human Engineering Research Laboratory, Westinghouse Waltz Mill Operations, and ANSYS Corporate Headquarters), along with an exhibit hall, and 36 distinguished honorees, who will be celebrated at various luncheons and a special Honors Assembly; and

WHEREAS, the ASME Auxiliary, which has given financial support to 1,273 engineering students through their scholarship and student loan programs, is celebrating their 95th Anniversary, this year.

NOW THEREFORE BE IT RESOLVED that I, William Peduto, Mayor of the City of Pittsburgh, do hereby declare November 9 – 15, 2018 "**IMECE Week**" here in our most livable City of Pittsburgh.



A blue ink signature of William Peduto.

WILLIAM PEDUTO
Mayor



Congress of the United States

House of Representatives

Whereas, Hearty congratulations are extended to the American Society of Mechanical Engineers (ASME) as they present the ASME International Mechanical Engineering Congress and Exposition (IMECE), the world's largest interdisciplinary mechanical engineering conference, on November 9-15, 2018, at the David L. Lawrence Convention Center in Pittsburgh, Pennsylvania; and

Whereas, The ASME IMECE will feature more than 470 sessions over 16 technical tracks exploring such topics as advanced manufacturing; energy; advances in aerospace technology; biomedical and biotechnology engineering; engineering education; heat transfer and thermal engineering; dynamics, vibration and control; mechanics of solids, structures and fluids; materials; fluids engineering; design, reliability, safety and risk; micro- and nanosystems engineering and packaging; and acoustics vibration and phononics; and

Whereas, The ASME IMECE, which has given financial support to 1,273 engineering students through their scholarship and student loan programs, and is celebrating their 95th Anniversary this year.

Now Therefore, As Representative of the 14th Congressional District of Pennsylvania, it gives me great pleasure to welcome and congratulate The American Society of Mechanical Engineers to Pittsburgh, Pennsylvania, for their International Mechanical Engineering Congress and Exposition.

A handwritten signature in blue ink that reads "Mike Doyle".

Mike Doyle
Member of Congress

COUNTY OF



ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

Proclamation

WHEREAS, the American Society of Mechanical Engineers (ASME) will host its International Mechanical Engineering Congress and Exposition (IMECE), the world's largest interdisciplinary mechanical engineering conference, on November 9-15, 2018 at the David L. Lawrence Convention Center in Allegheny County; and

WHEREAS, ASME is a non-profit membership organization that enables collaboration, knowledge sharing, career enrichment, and skills development across all engineering disciplines; founded in 1880 by a small group of leading industrialists, ASME has growth through the decades to include more than 130,000 members in 151 countries – 32,000 of these members are students; and

WHEREAS, the ASME IMECE will feature more than 470 sessions over 16 technical tracks, 20 track plenary presentations, four technical tours, an exhibit hall and will honor 36 distinguished honorees at various luncheons and a special Honors Assembly; ASME will also commemorate the contributions of four distinguished academic leaders: Yeboshua (Shuki) Frostig of the Technion-Israel Institute of Technology, Devdas Pai of North Carolina A&T State University, Kirti (Karman) Ghia of the University of Cincinnati, and ASME Medalist and Honorary Member Frank Kreith; and

WHEREAS, this year, the ASME Auxiliary which provides financial support to 1,273 engineering students through its scholarship and student loan program, is celebrating its 95th anniversary; the National Science Foundation is providing a track to allow for interaction with its program directors from two divisions; students will once again have a forum to present their research, design projects, and other engineering solutions and endeavors; and ASME has dozens of other speakers and activities established for the attendees of the ASME IMECE.

NOW, THEREFORE, BE IT RESOLVED that I, Allegheny County Executive Rich Fitzgerald, by virtue of the authority vested in me, do hereby proclaim November 11-15, 2018 as "International Mechanical Engineering Congress and Exposition Week" in Allegheny County. As a mechanical engineer by trade, I'm delighted to host such talented engineers and professionals.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the County of Allegheny to be affixed this 11th day of November, 2018.

Rich Fitzgerald

RICH FITZGERALD



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Welcome from the Chairs

ASME 2018 International Mechanical Engineering Congress and Exposition (IMECE), November 9–15, 2018, Pittsburgh, PA, USA

Dear Distinguished Attendees:

Welcome to mighty Pittsburgh, Pennsylvania—The Steel City—for this year’s annual IMECE! We are thrilled to bring together colleagues in academia, industry, and government in a stimulating environment to promote scholarship, innovation, and social investment not only to advance the mechanical engineering discipline but also to address technical challenges confronting the globe.

Through the exchange of ideas and interdisciplinary collaborations, IMECE hopes to facilitate the creation of the next round of engineering discoveries and developments to improve health care, transportation, space exploration, new product design and manufacture, and energy. Our conference comprises 13 Technical Tracks with over 2,500 presentations, representing high-impact scholarly work that encompasses a diverse range of topics from the fundamental to the applied. In addition to the technical sessions, our agenda seeks to build partnerships among our communities, promote leadership development, and engage with our students—the future of our society.

We kick off IMECE on Sunday with the Opening Reception & Undergraduate Research and Design Expo that includes Student Design and Poster Competitions. Monday morning will open with an exciting Breakfast Keynote from **Frank DeMauro**, Vice President and General Manager of the Advanced Programs Division of the Space Systems Group of Northrop Grumman. That evening, we will hold the Honors Reception and Assembly. Like last year, we have scheduled the Track Plenary Sessions to be presented each morning, running Tuesday through Thursday. A special Breakfast and Plenary Presentation will be given on Wednesday morning by **Mark Hindsbo**, Vice President and General Manager of the Design Business Unit of ANSYS. On Wednesday as well, you can find the General Poster Session, along with an NSF Workshop, which includes One-on-One Meetings with Program Managers, and NSF Student Poster Competitions. To conclude the week on Thursday, our Closing Plenary Luncheon will feature **Vijay Kumar**, Nemirovsky Family Dean of Penn Engineering. As in the past, the Conference Exhibit runs from Sunday through Wednesday. We would also like to highlight several Honoring Symposia, recognizing Prof. Frostig, the late Prof. Devdas Pai, the late Dr. Kirti (Karman) Ghia, and Prof. Frank Kreith.

The conference should provide a setting conducive for professional networking with your colleagues, as well as involvement opportunities with the society through ASME divisions and technical committees, whose events you can find listed in the program. The ASME Crowd Compass Attendee Hub App can assist you with scheduling the various activities and social breaks.

As always, we are incredibly appreciative of the immense efforts of our dedicated volunteer organizers and the exceptional ASME Staff. We thank you, the attendees, in advance for making the 2018 IMECE successful with your contributions, talents, and active engagement.

We hope that you enjoy IMECE 2018 and our beautiful host “City of Bridges.” We look forward to meeting you and learning about your professional interests at Congress throughout the week.

Sincerely,



Olesya I. Zhupanska
2018 IMECE Technical Program Chair



Stephen D. Tse
2018 IMECE General Conference Chair



Alberto Cuitino
2018 IMECE Technical Program Vice Chair



Rama Koganti
2018 Steering Committee Chair



Francine Battaglia
2018 Steering Committee Vice Chair



Assimina Pelegri
2018 Steering Committee Senate Chair



George Kardomateas
2018 Steering Committee Senate Co-Chair



General Information

General Information



ASME (BOOTH 209)

Two Park Avenue
New York, NY 10016-5990 USA
+1 800-THE-ASME
(800-843-2763)
www.asme.org

ASME is a not-for-profit membership organization that enables collaboration, knowledge sharing, career enrichment, and skills development across all engineering disciplines, toward a goal of helping the global engineering community develop solutions to benefit lives and livelihoods. Founded in 1880 by a small group of leading industrialists, ASME has grown through the decades to include more than 130,000 members in 151 countries. Thirty-two thousand of these members are students.

While at IMECE, take time to visit the ASME booth in the Exhibit Hall, Hall B on the second floor of the David L. Lawrence Convention Center. Learn about ASME's two newest Journals on *Medical Diagnostics* and *Nondestructive Evaluation*, and pick up information about ASME Transactions Journals, Proceedings, ASME Press books, Codes & Standards, Catalogs, and The ASME Digital Collection. Representatives from ASME Publications and Membership will be present to answer your questions

ASME CROWD COMPASS ATTENDEE HUB APP

Download the ASME Crowd Compass Attendee Hub App and hold the entire program at the palm at your hand! The ASME Crowd Compass Attendee Hub App allows you to easily look up sessions, search for papers or people, message with other attendees, and create your own schedule. Be sure to download the app for the latest information and chances to win prizes.

AUTHORS

SPEAKERS' PRACTICE ROOM

Room 322 on the third floor of the David L. Lawrence Convention Center is the Authors'/Speakers' Practice Room. The schedule is Monday–Thursday, November 12–15, 7:00am–5:00pm. The room is equipped with two (2) LCD projectors, two (2) laptop computers, and two (2) screens for authors/speakers to practice their presentations.

SCANNING

All authors are required to have their badge scanned before entering a technical session. Only fully registered authors are allowed to attend plenary and technical sessions.

AUDIOVISUAL EQUIPMENT IN SESSION ROOMS

All technical sessions are equipped with one LCD projector, one laptop, one screen, and a slide advance. You may bring your presentation on USB flash drive and load it onto the laptop in the session room.

BADGES ARE REQUIRED FOR ADMISSION TO ALL ACTIVITIES

All conference attendees must wear their official IMECE 2018 conference badge in order to gain admission to conference sessions, events, and activities. No one will be admitted to the technical sessions unless he/she is registered and wearing a badge that shows “Full Conference.”

BUSINESS CENTER

There is no business center located in the convention center. FedEx/Kinkos is located across from the Convention Center at 960 Penn Avenue, Pittsburgh, PA 15222. Services include, but are not limited to, laser and color printing, document scanning, and ground/air shipping. For more information, you can contact this location at (412) 391-2014.

Hours of Operation

Monday–Friday
7:30am–9:00pm
Saturday 8:00am–6:00pm
Sunday Closed

CHILDCARE SERVICES (NEW BENEFIT FOR IMECE 2018)

For those needing childcare services this year, we are pleased to be offering a new benefit for IMECE 2018.

ASME will reimburse up to a total of \$250/per registered 2018 IMECE attendee for childcare services incurred by a licensed service provider while attending IMECE November 9–15, 2018, between the hours of 8am–5pm. Below is a list of local companies, provided by Visit Pittsburgh.

Please note that neither Visit Pittsburgh nor ASME is recommending any one company. Additionally, ASME suggests you may wish to consult with your local hotel concierge for additional licensed service provider suggestions.

Nanny Poppinz

412-307-4914
<http://www.nannypoppinz.com/agency/nanny-childcare-pittsburgh-pennsylvania.html>

East Wind Nannies

412-467-6396
<https://eastwindnannies.com/pittsburgh>

Urban Sitter

This site will review each person, give their pricing, and list out their experience. You will need to join to see each person's full profile.
<https://www.urbansitter.com/college-babysitters/university-of-pittsburgh>

KinderCare

412-765-3973

They are not able to provide babysitting services off-property but they do provide child care in their downtown location. They are open 6:30am-6:30pm.

CONTINENTAL BREAKFAST

Continental breakfast will be served on Monday, November 12 & Wednesday, November 14, prior to the presentations in Ballroom A and Tuesday & Thursday, November 13 & 15, in the Ballroom Foyer of the David L. Lawrence Convention Center. Fully paid attendees are entitled to attend. The schedule is as follows:

Monday, November 12	7:30am–8:00am	*Ballroom A
Tuesday, November 13	7:30am–8:00am	
Wednesday, November 14	7:30am–8:00am	*Ballroom A
Thursday, November 15	7:30am–8:00am	

GIVE-BACK PROJECTS

Help us to help the community! This year we would like to support two important local charities, see how you can participate.

Kids In Need Foundation

The Kids In Need Foundation provides low-income schools with the supplies needed to participate and engage in the classroom. Drop off crayons, glue sticks, markers, notebooks, pencils, and pens.

Women’s Center & Shelter of Greater Pittsburgh

Donate your old smartphones and cell phones to Women’s Center & Shelter and you are supporting victims of domestic violence. Donated phones are sent to the Shelter Alliance Program, which will result in a monetary donation to Women’s Center & Shelter to benefit programs and services for survivors of domestic abuse.

There are drop off locations for both charities in the registration areas at the Westin Hotel and David L. Lawrence Convention Center.

GUEST HOSPITALITY AND FAMILY MEETING ROOM

The hospitality room is located in Pennsylvania East, on the second floor of the Westin Hotel. The schedule is as follows:

Sunday, November 11	7:00am–9:30am
Monday, November 12	7:00am–9:30am
Tuesday, November 13	7:00am–9:30am
Wednesday, November 14	7:00am–9:30am

LUNCH

Conference lunches will be served Monday–Wednesday, November 12–14, in Hall B of the David L. Lawrence Convention Center. On Thursday, November 15, lunch is served in Ballroom A on the third floor. Fully paid attendees are entitled to attend. The schedule is as follows:

Monday, November 12	11:30am–12:30pm
Tuesday, November 13	11:45am–12:45pm
Wednesday, November 14	11:45am–12:45pm
Thursday, November 15	12:40pm–1:10pm

MEETING INFORMATION

Main meeting information is located on the third floor area of the David L. Lawrence Convention Center. The operating hours are as follows:

Sunday, November 11	7:00am–6:00pm
Monday, November 12	7:00am–6:00pm
Tuesday, November 13	7:00am–6:00pm
Wednesday, November 14	7:00am–6:00pm
Thursday, November 15	7:00am–5:45pm



EMERGENCY INFORMATION

Alert convention center staff by picking up a white house phone to report a medical or security emergency. Describe the exact location of the incident and the nature of the emergency. Whenever an emergency situation is detected and announced, everyone is expected to evacuate the facility and safely assemble outside until the “All Clear” is given. Be sure to move to a safe distance and check the App for updated information.



EXHIBITS INFORMATION

The exhibits are located in Hall B on the second floor of the David L. Lawrence Convention Center. The expo hall is your social hub! Be sure to visit the exhibitors and check out the Education Theater, poster sessions, and lounge.

The exhibit hours are as follows:

Sunday, November 11
5:30pm–7:00pm

Monday, November 12
11:30am–4:00pm

Tuesday, November 13
11:45am–4:00pm

Wednesday, November 14
11:45am–4:00pm

General Information



RIBBON CUTTING

Join us on Sunday, November 11th at 5:25pm for the ribbon cutting ceremony outside of Exhibit Hall B.



PHOTOGRAPHY

ASME has retained the services of a photographer to capture photo images of the events and activities from the conference. The photographer will be taking photos as assigned by the ASME Communications Department. All photographs are the sole property of ASME, and ASME retains all rights in and to said photographs. These photographs may be used for promotional purposes only, including, but not limited to, the ASME website. If you require more information about the use of IMECE photographs, please go to the media desk at Conference Registration.

MEMBERSHIP TO ASME (ONE YEAR FREE)

Registrants who paid the non-member conference registration fees will receive a one-year ASME Membership. ASME will automatically activate this complimentary membership for qualified attendees. Please allow approximately four weeks after the conclusion of the conference for your membership to become active. Visit www.asme.org/membership for more information about the benefits of ASME Membership.

MOTHER'S ROOM

The David L. Lawrence Convention Center offers a dedicated space for parents of newborns/infants to be used as a private space for nursing mothers. When at the convention center, please ask a staff member for the location of the mother's room on the second level and how to gain access.

OPENING RECEPTION

Exhibit Hall Grand Opening and Opening Reception

5:30pm–7:00pm

Hall B, David L. Lawrence Convention Center

All registrants are invited to this special event to celebrate the opening of the IMECE exhibits. Come grab a drink and some food, meet this year's group of exhibitors, and learn about their products and services.

POSTER PRESENTATIONS

Poster presentations will be held at the following times:

Sunday, November 11, 2018

5:30pm–7:00pm

Hall B, David L. Lawrence Convention Center

Undergraduate Research and Design Expo Student Poster Competition

Poster Setup: 2:30pm–3:30pm

Poster Judging: 3:30pm–6:30pm

Expo (General Viewing): 5:30pm–7:00pm

Winners Announced: 6:30pm–7:00pm

Wednesday, November 14, 2018

11:45am–3:00pm

Hall B, David L. Lawrence Convention Center

NSF Student Competition (Posters Only)

Poster Setup 10:00am–11:45am

General Viewing/Judging 11:45am–2:30pm

Awards 2:30pm–3:00pm

Virtual Podium (Posters Only)

Poster Setup 10:00am–11:30am

General Viewing 11:45am–2:30pm

PRAYER ROOM

Room 415 on the fourth floor of the David L. Lawrence Convention Center is exclusively for those who need to pray in between sessions. There will be dividers in the room to create a semi-private space.

PRESENTER ATTENDANCE POLICY

According to ASME's Conference Presenter Policy, if a paper is not presented at the Conference by a fully registered author of the paper, the paper cannot be published in the official archival Proceedings, which are published on The ASME Digital Collection post-conference. Papers not presented at the conference cannot be cited.

PUBLICATIONS: IMECE2018 CONFERENCE PAPERS AND PROCEEDINGS

Technical papers accepted for publication for IMECE2018 will be available through a dedicated Online Papers site available to all fully paid attendees beginning a week before the conference.

- Post-conference, an ISO batch file and two zip files will be made available on the Online Papers site so that users can download to their personal computer systems.
- Post-conference, papers presented at the conference will be published as the official Proceedings of the conference on The ASME Digital Collection (asmedigitalcollection.asme.org). Authors may refer to The Collection for DOI links and citation information for their papers.

All ASME conference Proceedings are disseminated worldwide and submitted for indexing to SCOPUS, COMPENDEX, the ISI Conference Proceedings Citation Index, and several other indexing and discovery services. For further information about ASME Publications, please stop by the ASME Booth at the Exhibit Hall.

REFRESHMENT BREAKS

Morning Break – Ballroom Foyer

Monday, November 12	9:30am–9:45am
Tuesday, November 13	9:45am–10:00am
Wednesday, November 14	9:45am–10:00am
Thursday, November 15	10:40am–10:50am

Afternoon Break – Exhibit Hall B unless otherwise noted

Monday, November 12	3:30pm–3:45pm	
Tuesday, November 13	3:00pm–4:00pm	*Join the University of Pennsylvania for their break reception in the exhibit hall.
Wednesday, November 14	3:30pm–3:45pm	
Thursday, November 15	3:50pm–4:00pm	(Ballroom Foyer)



REGISTRATION

Conference registration is located in the Exhibit Hall B foyer on the second floor of the David L. Lawrence Convention Center. The operating hours are as follows:

Sunday, November 11	7:00am–6:00pm
Monday, November 12	7:00am–6:00pm
Tuesday, November 13	7:00am–6:00pm
Wednesday, November 14	7:00am–6:00pm
Thursday, November 15	7:00am–5:45pm

Registration for committee meetings and special events is located in the Rotunda Area on the second floor of the Westin Hotel during the following hours:

Friday, November 9	8:00am–5:00pm
Saturday, November 10	7:00am–6:00pm
Sunday, November 11	7:00am–6:00pm
Monday, November 12	7:00am–6:00pm
Tuesday, November 13	7:00am–6:00pm
Wednesday, November 14	7:00am–6:00pm

TECHNICAL SESSIONS

All attendees are required to have their badge scanned before entering a technical session. Only fully registered conference attendees are allowed to attend plenary and technical sessions.

TICKET SALES

Many division and society awards are given at IMECE. Tickets for these functions may be purchased on-site at the ASME Registration Desk. Please purchase tickets as soon as possible after you register. In order to ensure accurate guarantees and avoid disappointment, tickets for all events will be sold up to 48 hours prior to the event or as long as there is flexibility to adjust the guarantee.



SOCIAL MEDIA

Let's be social! We encourage you to use the hashtag **#IMECE2018** to tag your social media posts and photos throughout the conference.



WIFI

Free Wi-Fi access is provided to IMECE conference attendees throughout the David L. Lawrence Convention Center. Free Wi-Fi access is also provided in the hotel rooms at the Westin Hotel and the Omni Penn Plaza. To access the Wi-Fi in the convention center and the Westin Hotel use these credentials:

David L. Lawrence Convention Center

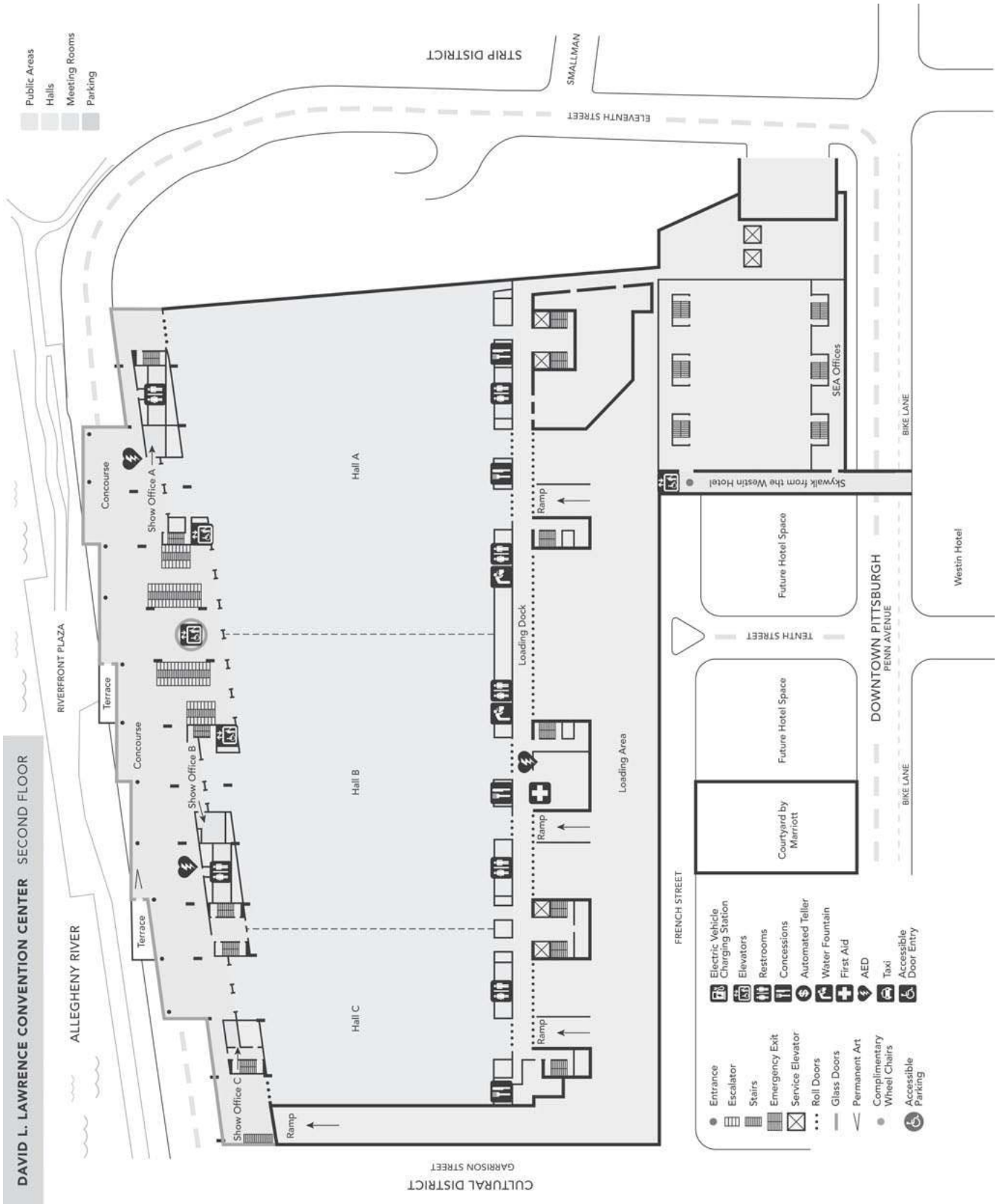
Network: IMECE
Password: imece2018

Westin Hotel

Network: Westin_Conference
Password: imece2018

Floor Plans

DAVID L. LAWRENCE CONVENTION CENTER – SECOND FLOOR



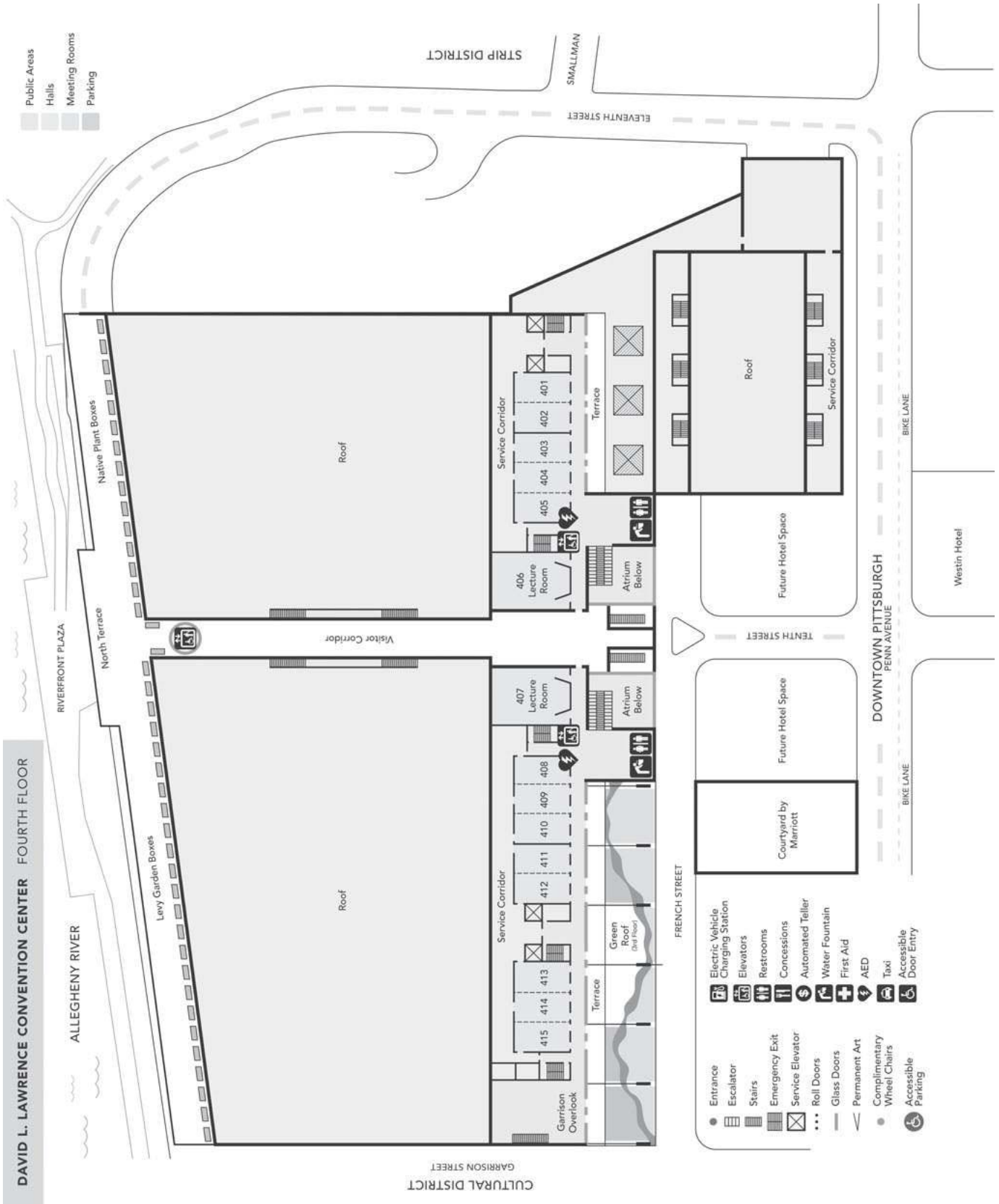
Floor Plans

DAVID L. LAWRENCE CONVENTION CENTER – SECOND FLOOR



Floor Plans

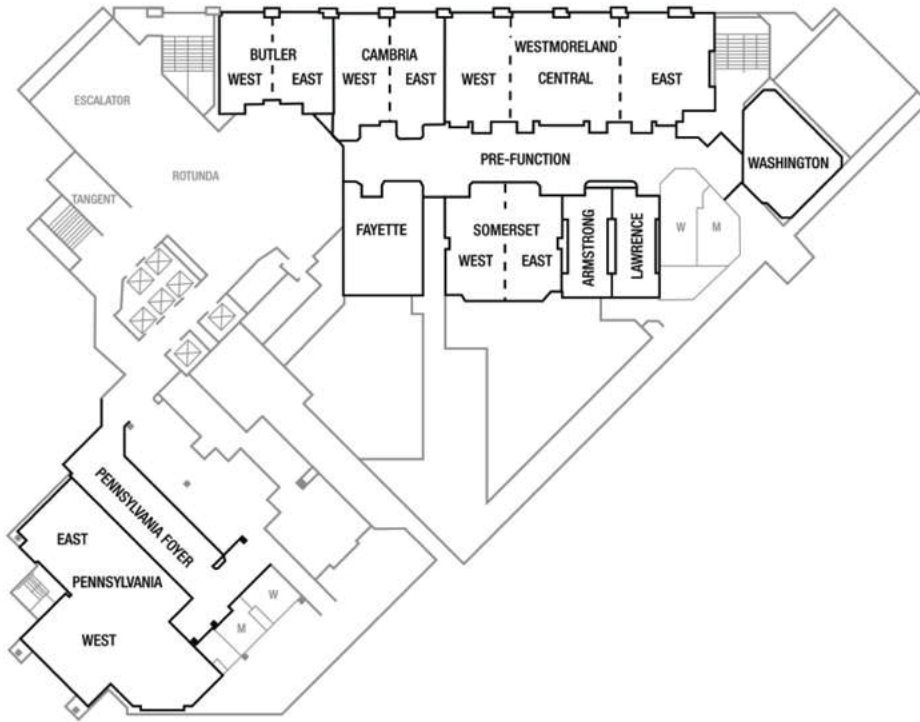
DAVID L. LAWRENCE CONVENTION CENTER – FOURTH FLOOR



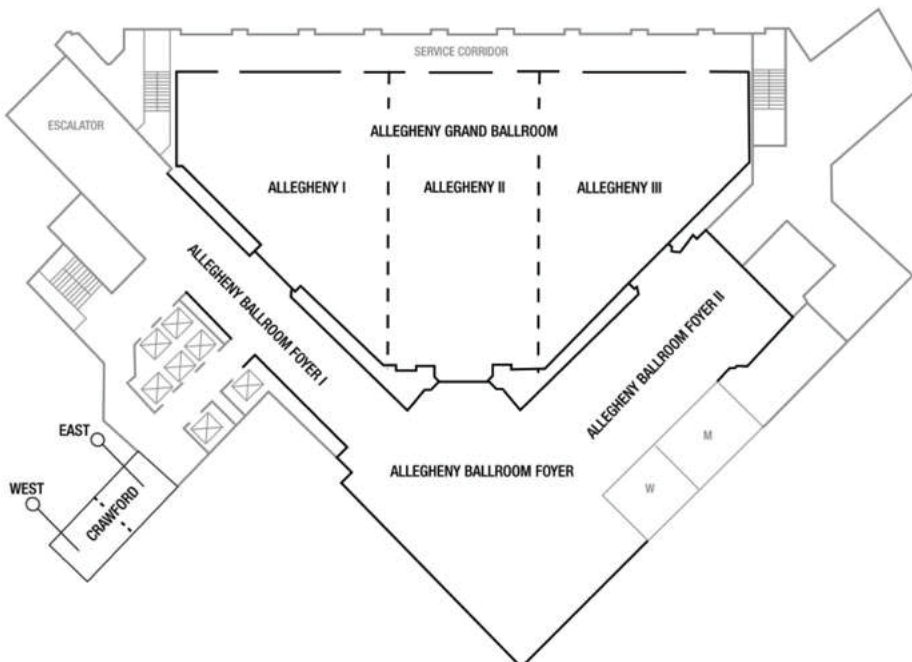
Floor Plans

WESTIN HOTEL

SECOND FLOOR



THIRD FLOOR





ALL TOUR BUSES LEAVE AT THE DLCC, CORNER OF 10TH & FRENCH STREETS

GUEST TOURS

CITY TOUR OF PITTSBURGH

Sunday November 11th | 9:30am–12:30pm

Price: \$55 per person

Check out the great city of Pittsburgh and see why it's one of the hottest cities in the country. Our knowledgeable tour guide will host this three-hour bus tour that will highlight the following:

North Shore – featuring PNC Park and Heinz Field stadiums and a stunning view of downtown Pittsburgh and its many golden bridges

Downtown – “Golden Triangle” with its diverse architecture of old and new. The city is shaped as a triangle with the beautiful Point State Park at the tip, where the confluence of two rivers forms a third.

Strip District – The one-half square mile shopping district is chock full of ethnic grocers, produce stands, meat and fish markets, and sidewalk vendors.

Oakland – Pittsburgh's “Meds and Eds” hub — This area is home to world-renowned hospitals as well as the University of Pittsburgh, Carnegie Mellon University, and so much more.

Mt. Washington – Stand on one of the observation decks and take in the spectacular panorama of the downtown skyline below and see how the Monongahela and Allegheny Rivers form the Ohio River and at the city's “Point.” *USA Today* named the view from Mt. Washington one of the 10 most beautiful views in America.

TOUR OF FALLINGWATER

Monday November 12th | 9:30am–3:30pm

Price: \$75 per person

Fallingwater is a house designed by architect Frank Lloyd Wright in 1935 in rural southwestern Pennsylvania, 43 miles (69 km) southeast of Pittsburgh. The house was built partly over a waterfall on Bear Run in the Mill Run section of Stewart Township, Fayette County, Pennsylvania, located in the Laurel Highlands of the Allegheny Mountains. The house was designed as a weekend home for the family of Liliame Kaufmann and her husband, Edgar J. Kaufmann, Sr., owner of Kaufmann's Department Store.

After its completion, *Time* called Fallingwater Wright's “most beautiful job,” and it is listed among Smithsonian's “Life List of 28 places to visit before you die.” The house was designated a National Historic Landmark in 1966. In 1991, members of the American Institute of Architects named Fallingwater the “best all-time work of American architecture” and in 2007, it was ranked 29th on the list of America's Favorite Architecture according to the AIA.

This guided house tour will provide you full access to this iconic landmark. Stay and shop in the gift shop, tour the grounds, and have lunch in the café.

TECHNICAL TOURS

CARNEGIE MELLON UNIVERSITY LABORATORY TOUR – SOLD OUT

Monday, November 12

1:00–4:00pm

Limit 50 guests

\$25

Carnegie Mellon College of Engineering is world renowned and focuses on innovative, interdisciplinary, and global education and research. All visitors will tour various labs, including:

Makerspace: The TechSpark makerspace is Carnegie Mellon University's focal point for technology innovation. This College of Engineering facility provides equipment for rapid fabrication of designs from idea to reality for coursework, research, and entrepreneurship, which includes Rabid Fabrication with Laser Machines.

Soft Machines Lab: The Soft Machines Lab develops materials and technologies that enable machines and robots to be safe for human contact. We focus on creating soft multifunctional materials that can act as artificial skin, muscle, and nervous tissue for applications in bio-inspired soft robotics, humanoid robotics, and wearable computing. Visitors will see the lab space and interact with some of the novel “soft-matter” technologies that we have recently discovered.

Robomechanics Lab: The Robomechanics Lab works on designing robots that can operate in challenging real-world environments. We will be showing several robotic platforms, including the four-legged Minitaur robot as well as a cheetah-inspired robot tail, a wheeled rover that can dig trenches in sandy terrain, and new robotic hooves that will allow a robot to climb steep rocky terrain.

Additive Manufacturing Lab: Tour the newly renovated metals additive manufacturing (AM) lab within the Mechanical Engineering Department and administered by the CMU Next Manufacturing Center. Equipment includes Optomec Aerosol Jet, EOS Laser Sintering, Arcam E-Beam Sintering, and ExOne Binder Jet AM machines. Parts fabricated by these machines support both fundamental research and educational efforts, including new undergraduate minor and master's degrees in AM.

Thermal Energy Engineering Lab: The Thermal Energy Engineering Labs seek to understand the underlying physics of thermal energy transport. The tour will focus on thermoreflectance techniques, which allow us to directly measure properties like thermal conductivity and thermal interface resistance in both nano- and macroscale materials. These properties are critical to thermal management in next generation electronics and to optimize the efficiencies of solid state energy conversion devices.

**UNIVERSITY OF PITTSBURGH HUMAN ENGINEERING RESEARCH LABORATORIES –
SOLD OUT**

Tuesday November 13
9:30am–12:00pm
Limit 50 guests
\$25

The Human Engineering Research Laboratories (HERL) is a collaboration between the University of Pittsburgh, the VA Pittsburgh Healthcare System, and UPMC Health System. HERL is dedicated to wheelchair and mobility research, specifically by improving the mobility and function of all people with disabilities through advanced engineering in clinical research and medical rehabilitation on local, national, and international levels. HERL also studies robotics in assistive technology, athletics in rehabilitation, assistive living spaces, wheelchair transfer efficiency, clinician training, and force and vibration on wheelchair users. Attendees will gain an understanding of the work being done at the Laboratories.

**WESTINGHOUSE WALTZ MILL OPERATIONS – The Center of Excellence for
Westinghouse's Global Field**

Services in Americas and Asia
Wednesday November 14
12:30pm–4:00pm
Limit 30 guests
\$25

Each spring and fall Westinghouse executes a series of outages at nuclear power plants across the United States. It is extremely important that these outages are executed efficiently and that emergent issues are dealt with on an expedited basis. Westinghouse provides outage services anywhere from approximately 20 to 40 customer sites each outage season (spring and fall). This requires Westinghouse to staff anywhere from 2,000 to 2,500 positions utilizing approximately 800 personnel. In order to achieve efficiency and predictability in execution, Westinghouse has an extensive training program that utilizes two training bays equipped with mock-ups and equipment to effectively prepare personnel for site operations. Tooling sophistication varies from the simplistic to complex robotic systems. The deployment of personnel and equipment along with the day-to-day response to ongoing outage operations proves to be quite a logistical endeavor. Westinghouse has developed process and procedures along with a Westinghouse Outage Control Center to manage the complexity of outage operations across multiple sites. Westinghouse invites you to come tour our facility and engage in outage service execution discussion. The tour is scheduled to take place from 1:30 to 3:00pm. Visitors are reminded that they must wear closed-toed shoes and no photography is permitted on the premises. This tour will be open to the first 30 participants who register. Attendance will be subject to approval.



**ALL TOUR BUSES
LEAVE AT THE DLCC,
CORNER OF 10TH &
FRENCH STREETS**

ANSYS CORPORATE HEADQUARTERS – SOLD OUT

Thursday November 15
8:30am–11:30am
Limit 50 guests
Cost \$25

Visit the world headquarters of ANSYS, global leader in engineering simulation. Here, advanced software tools that help engineers simulate diverse physics such as fluid dynamics, structures, electronics, semiconductors, and embedded software are planned, developed, and marketed. In this “insider’s” tour, you will:

- Tour the workspace and meet the team that develops ANSYS Mechanical
- Learn about advanced simulation concepts and technologies
- Understand the process used to validate, verify, and demonstrate that simulation codes deliver results that match physical testing
- Try ANSYS Discovery Live, an interactive experience in which you can manipulate geometry, materials types, or physics inputs, then instantaneously see changes in performance
- Read posters on a variety of advanced fluids, structures, and multiphysics topics

ASME LANDMARKS

Pittsburgh is a city of engineering innovation and home to the Duquesne and Monongahela Inclines—two official ASME Historical Landmarks. These funiculars have been in operation for over 140 years, transporting pedestrians from the uphill neighborhoods to the industry by the riverbanks. Designed by engineer John Endres, they are the oldest and last of the original seventeen inclines in Pittsburgh and are examples of 19th and early 20th century transportation—still in action today! Designated Historical Landmarks in 1977, the city views are spectacular—offering sweeping views from Mt. Washington of the three rivers and the beautiful city—and the engineering history speaks for itself. The landmarks are approximately one mile in distance from each other.



**** Share your photos
of these engineering
marvels with the hashtag
#ASMElandmarks ****

Traveling to Monongahela Incline – from Westin Convention Center

Parking is free.

8 minute drive from Westin Convention Center

Bus fares are only \$2.50 one way, exact change only.

Bus from Liberty Avenue at 10th Street

Traveling to Duquesne Incline – from Westin Convention Center

Parking is free.

5 minute drive from Westin Convention Center

Bus fares are only \$2.50 one way, exact change only.



Special Events

Special Events FRIDAY / SATURDAY / SUNDAY

FRIDAY, NOVEMBER 9

ASME Business Meeting

5:00–5:30pm
**Allegheny Grand Ballroom III,
Third Floor, The Westin Hotel**

Call to order by Said Jahanmir, ASME President, 2018–2019

Report by the Treasurer
Membership Report
2017–2018 Annual Report
State of the Society Video
Report on Proxies Received
Ratification of Auditor
Election of 2019 Nominating Committee
Other Business

SATURDAY, NOVEMBER 10

Old Guard Oral Presentation Competition

9:00am–4:00pm
**Westmoreland Central,
Second Floor, The Westin Hotel**

All are invited to attend the finals of the Society-level Old Guard Oral Presentation Competition. Meet the engineering students who have successfully competed at the 2018 E-Fests and are now vying for the \$2,000 ASME Old Guard Prize for outstanding presentation skills.

Like all effective professionals, engineers must possess a well-developed ability to synthesize issues and communicate both orally and in writing. This competition is designed to emphasize the value of an ability to deliver clear, concise, and effective oral presentations, particularly pertaining to some sphere in which an engineer is or should be involved. Presentation topics must address a technical, economic, or environmental aspect of engineering or other basic engineering theme, and often relate to the students' engineering design/analysis projects.

For more information, please visit
<https://www.asme.org/events/competitions/old-guard-competitions/old-guard-prize-oral-presentation-competition/>

Old Guard Committee Reception

6:30–7:30pm
Somerset East, Second Floor, The Westin Hotel

Please join us for the 2018 ASME Old Guard Committee Reception on Saturday, November 10. The ASME Old Guard Committee will announce the Old Guard Oral Presentation winners and present them with their award certificates.

SUNDAY, NOVEMBER 11

2018 Student Design Competition Finals @ IMECE Ballroom B, David L. Lawrence Convention Center

Run of Show | Staff POCs: Erin Dolan (646-369-7248) and Brandy Smith (917-596-0306)

The 2018 Student Design Competition has challenged the imagination and technical design skills of all its participants. At the Finals on Sunday, November 11, teams who've participated in an SDC held at each E-Fest this year will compete against each other in a modified, four-way football (soccer) competition. These teams will come equipped with a strategic game plan, robot(s), and a will to battle it out for the Championship Title.

SCHEDULE

7:00am–3:30pm	SDC Finals (Preliminary Rounds) Ballroom B
7:00am–7:30am	Staff set signs, tape course/field, etc.
7:30am–8:00am	Team Arrivals and check in
8:00am–9:00am	Robot Inspections
9:00am–10:30am	Round 1 (on one playing field)
10:30am–12:00pm	Round 2 (on the other playing field)
12:00pm–1:00pm	LUNCH BREAK
1:00pm–1:45pm	Semi Finals Round 1 (on one playing field)
1:45pm–2:30pm	Semi Finals Round 2 (on the other playing field)
3:00pm–3:30pm	FINALS

Members and Students Luncheon
Sponsored by: Committee on Honors**12:00pm–1:30pm**
Allegheny Grand Ballroom II,
Third Floor, The Westin Hotel

Ticket: \$60

WILLIAM T. ENNOR MANUFACTURING TECHNOLOGY AWARDScott Smith, Ph.D., Fellow
University of North Carolina at Charlotte**CHARLEST. MAIN STUDENT LEADERSHIP AWARD****GOLD**Brandon Graham, Member
Rowan University**SILVER**Joseph Pechstein, Member
Milwaukee School of Engineering**GUSTUS L. LARSON MEMORIAL AWARD**Kripa K. Varanasi, Ph.D., Member
Massachusetts Institute of Technology**PITAU SIGMA GOLD MEDAL**Nenad Miljkovic, Ph.D., Member
University of Illinois at Urbana-Champaign**CHARLES RUSS RICHARDS MEMORIAL AWARD**Kon-Well Wang, Ph.D., Fellow
University of Michigan**HENRY HESS EARLY CAREER PUBLICATION AWARD**Arin M. Ellingson, Ph.D., Member
Casey P. Johnson, Ph.D.
Mary H. Foltz
Craig C. Kage
University of Minnesota**OLD GUARD EARLY CAREER AWARD**

Michael P. Jof Standards & Technology

GEORGE WESTINGHOUSE GOLD MEDALTim Lieuwen, Ph.D., Fellow
Georgia Institute of Technology**ARTHUR L. WILLISTON MEDAL**Noah M. Purdy, Member
Delta Systems Inc.**First-Time Attendees Orientation****2:30pm–3:30pm**
Room 407, David L. Lawrence Convention Center

First-time attendees to IMECE are cordially invited to this informal yet informative session to learn about how to navigate the conference, how to use the program, the new App, and more importantly, where all the best parties are. Snacks and refreshments will be served.

VOLT Leadership Workshop IMECE 2018**2:00pm–4:00pm**
Pennsylvania East, Second Floor, The Westin Hotel**Fostering an Innovative Environment**

In order for ASME to meet the challenges of the future, we must innovate. When we innovate and try new things, some of them are bound to fail. Failure is a necessary part of the process. The key is to recognize our failures, fail fast, and learn from our mistakes. In this workshop, we will explore how we can foster an innovative environment that allows for failure and encourages learning.

ASME FutureME Mini-Talks**Presented by the ASME Early Career Engineers**
Programming Committee**4:00pm–5:00pm**
Rooms 411/412,
David L. Lawrence Convention Center

Held at the 2018 ASME International Mechanical Engineering Congress and Exposition (IMECE)

Join the ASME FutureME Community for an opportunity to hear from several experienced engineers as they present short and inspirational Mini-Talks. Our presenters will share their personal stories and experiences in career development and the choices they have made throughout their careers to become successful.

The Mini-Talks will focus on technical disciplines related to ASME's core technologies and enabling applications, like advanced manufacturing, bioengineering, robotics, materials, or design engineering. Presenters will discuss subjects such as current trends in these technical industries, skills and training that helped them be successful, and potential career opportunities in these disciplines.

Exhibit Hall Grand Opening and Opening Reception**5:30pm–7:00pm**
Hall B, David L. Lawrence Convention Center

All registrants are invited to this special event to celebrate the opening of the IMECE exhibits. Come grab a drink and some food, meet this year's group of exhibitors, and learn about their products and services.

THE ASME AUXILIARY IS TURNING 95 YEARS OLD



In the past 95 years, the ASME Auxiliary has assisted ASME and played a key role in financially supporting over 1,301 engineering students through their scholarship and student loan programs to an amount for more than \$2,500,000.

Recipients are working in the fields of robotics and bio-mechanical engineering and employed with major engineering and aerospace corporations.

Perhaps you or someone you know are one of these deserving and lucky recipients. We would like to not only continue but expand the program to help our students be more competitive in the global workplace. Please visit the ASME's Auxiliary table at the IMECE's Opening Reception and learn more about how you can get involved with our very important mission. You may ask us how you can help the Auxiliary to excel in our main mission: "To establish education funds for the purpose of assisting worthy students in the study of mechanical engineering at the undergraduate and graduate level."

Sara Sahay
ASME Auxiliary President

ASME FutureME Social Meetup for Early Career Engineers

Hosted by the ASME Early Career Engineers Programming Committee

7:00pm–9:00pm

Hosted at Bill's Bar and Burger, 1001 Liberty Avenue at The Westin Convention Center Hotel

Registration required: \$10

Co-located with the 2018 ASME International Mechanical Engineering Congress and Exposition (IMECE)

Meet new people • Join a community of like-minded engineers
• Learn from others in engineering • Share experiences • Explore Pittsburgh



To register scan the QR code or go to <http://bit.ly/SMREG18>.

MONDAY, NOVEMBER 12

Keynote Event

8:00am–9:30am

**(breakfast served from 7:30am to 8:00am)
Ballroom A, David L. Lawrence Convention Center**

Welcome Remarks: Valerie McDonald Roberts, Chief Urban Affairs Officer, Office of Mayor William Peduto, Pittsburgh, PA

Keynote Speaker: Frank DeMauro, Vice President and General Manager, Advanced Programs Division, Space Systems Group, Northrop Grumman

"Longer Lifespan: The Value of Satellite Servicing and In Space Robotics"



Frank DeMauro will describe the various methods currently being developed by Northrop Grumman for in-orbit life extension and in-orbit spacecraft assembly. The status of the development of robotic and non-robotic capabilities will be presented along with Northrop Grumman's roadmap for commercial servicing vehicles.

Presenter Biography: **Frank DeMauro** is the Vice President and General Manager of Northrop Grumman's Advanced Programs Division, where he is responsible for the program execution, business development, and financial performance of the company's Human Space Systems, Satellite Servicing, and Commercial Communication Satellite business segments. These business segments include critical Northrop Grumman programs such as NASA's Commercial Resupply Services (CRS) and Mission Extension Vehicle (MEV) programs.

Previously, Mr. DeMauro managed the Human Space Systems business area and served as the Program Director of the CRS program where he managed the development, production, and delivery of multiple Cygnus spacecraft and oversaw

International Undergraduate Research and Design Exposition

5:30pm–7:00pm

Hall B, David L. Lawrence Convention Center

Poster Setup:	2:30pm–3:30pm
Expo (General Viewing):	5:30pm–7:00pm
Winners Announced:	6:30pm–7:00pm

The Student Expo provides undergraduate engineering students with a professional and technical forum for presenting their research, design project, and other engineering solutions and endeavors to top researchers and scientists from academia, industry, government, prospective employers, entrepreneurs graduate schools, and potential faculty advisors.

several successful cargo delivery missions. A long time Northrop Grumman employee, Mr. DeMauro has also held the position of Vice President of Engineering as well as numerous leadership and program management positions in Northrop Grumman's commercial communications satellite group. In his 30 year career, he has also held positions in Subsystem Development, Systems Engineering, and Business Development.

Mr. DeMauro has received the NASA Exceptional Public Service Medal, the National Space Society Space Pioneer Award, and the Pete Rustan Civil Space "Courage to Innovate" Award. As a member of the Cygnus team, he has also received the AIAA Space Systems Award and the RNASA Stellar Award for the COTS Development Program.

A native of New Jersey, Mr. DeMauro holds a B.S. in Mechanical and Aerospace Engineering from Rutgers University.

VOLT Leadership Workshop IMECE 2018
10:00am–12:00pm
Fayette, Second Floor, The Westin Hotel

Fostering an Innovative Environment

In order for ASME to meet the challenges of the future, we must innovate. When we innovate and try new things, some of them are bound to fail. Failure is a necessary part of the process. The key is to recognize our failures, fail fast, and learn from our mistakes. In this workshop, we will explore how we can foster an innovative environment that allows for failure and encourages learning.

President's Luncheon
12:00pm–1:30pm
Allegheny Grand Ballroom II,
Third Floor, The Westin Hotel

PER BRUEL GOLD MEDAL FOR NOISE CONTROL AND ACOUSTICS

Sean F. Wu, Ph.D., Fellow
 Wayne State University

J. HALL TAYLOR MEDAL

Daniel T. Peters, Fellow
 Structural Integrity Associates, Inc.

EDWARD F. OBERT AWARD

Andrea Toffolo, Ph.D.
 Luleå University of Technology
 Andrea Lazzaretto, Ph.D., Fellow
 University of Padova
 Sergio Rech, Ph.D.
 University of Padova

SOICHIRO HONDA MEDAL

Ashwani K. Gupta, Ph.D., Fellow
 University of Maryland

FRANK KREITH ENERGY AWARD

William Martin Worek, Ph.D., Fellow
 Texas A&M University – Kingsville

JAMES HARRY POTTER GOLD MEDAL

Raj M. Manglik, Ph.D., Fellow
 University of Cincinnati

HENRY LAURENCE GANTT MEAL

Todd R. Allen, Member
 Allen Research Tech-Services, Inc.

KATE GLEASON AWARD

Awatef A. Hamed, Ph.D., Fellow
 University of Cincinnati

SPIRIT OF ST. LOUIS MEDAL

Stephen P. Engelstad, Ph.D., Member
 Lockheed Martin Aeronautics Company

WORCESTER REED WARNER MEDAL

Martin Ostoja-Starzewski, Ph.D., Fellow
 University of Illinois at Urbana–Champaign

HENRY R. WORTHINGTON MEDAL

Jaikrishnan R. Kadambi, Ph.D., Fellow
 Case Western Reserve University

MCDAVID MENTORING AWARD

Robert M. Wagner, Ph.D., Fellow
 Oak Ridge National Laboratory

ME/MET Department Heads Forum

1:30pm–3:30pm
Westmoreland Central & East,
Second Floor, The Westin Hotel

The Department Heads Forum is an annual event at the ASME Congress for mechanical engineering and mechanical engineering technology department heads. The forum is a chance to learn about some of the latest research funding developments, curricular innovations, accreditation issues, and upcoming ASME Engineering Education activities.

Noise Control and Acoustics Division: Rayleigh Lecture

Dr. Roger Ohayon, Conservatoire National des Arts et Metiers, Structural Mechanics and Coupled Systems Laboratory

3:45pm–5:15pm
Room 409, David L. Lawrence Convention Center



After being Researcher at the aerospace research laboratory in France (ONERA), Roger Ohayon joined the Conservatoire National des Arts et Metiers (CNAM/Structural Mechanics and Coupled Systems Research Laboratory) as Professor Chair of Mechanics where he is now Emeritus Professor. He is Fellow of several associations (AIAA, ASME, IACM) and the recipient of the Humboldt Research Award, Lifetime Achievement SPIE Award, ASMS/ASME/AIAA Award, Prandtl Award from Eccomas, IACM Awards, EASD Senior Prize, and the French Academy of Science Award. His expertise lies in mechanical and computational modeling of fluid-structure and structural acoustics interaction problems and smart structural systems.

Special Events MONDAY

He is on the editorial board of thirteen international journals, such as *IJNME*, *CMAME*, *Computational Mechanics*, and the associate editor of *JIMSS* and *AIAA*. He is the co-editor of several books and co-author of more than one hundred publications in refereed international journals.

Roger Ohayon has pioneered the development of mechanical and computational methods for prediction of fluid-structure vibrations of coupled systems in fluid-structure interaction (hydroelasticity and sloshing) and in structural-acoustics (noise prediction). In this context of fluid-structure interaction (attenuation for liquids in reservoirs) and of structural-acoustics (for noise reduction), he proposed to reduce vibrations using structural devices for smart adaptive intelligent thin systems and, more recently, has proposed an original dissipative interface modeling using passive/active and hybrid treatments.

Title: Computational Vibroacoustics in Low and Medium Frequency Bands

It is proposed to analyse, from predictive computational point of view—finite element discretization and specially appropriate various reduced order models—the dynamic behaviour of complex coupled systems and their adaptive intelligent treatment of interfaces for vibration and noise reduction of interior fluid-structure interactions problems, such as liquid/gas-structure, in low and medium frequency domains.

The applications may be found, for example, in aerospace engineering such as liquid propelled launchers for the attenuation of the vibrations of liquids in tanks, the attenuation of noise in fairings for the satellites as well as attenuation of noise in fuselage cabin of aircrafts or helicopters, and attenuation of noise in automotive industries.

The frequency domain of interest is quite important for the computational analysis in order to avoid a large number of degrees of freedom, which lead to prohibitive computer times. In effect, the coupled situation is quite different from the classical problem of acoustic response to prescribed structural interface displacement/velocity fields because the dynamic of the structure can be very complex (composite structure, for instance). The low-frequency regime is characterized by a low modal density for structural-acoustics systems in which a frequency-independent modeling of the structural damping is, in most cases, satisfactory. The medium frequency range is characterized by a frequency-dependent damping in the structure as well as in the fluid. A distinction should be clearly made between gas and/or liquids taking into account incompressibility/compressibility as well as light fluids/heavy fluids considerations with gravity sloshing effects.

In parallel of direct symmetric variational formulations/numerical finite elements for modal analysis of fluid-structure interior vibrations, the construction of a family of appropriate reduced order models is of prime importance for sensitivity analysis, multidisciplinary optimization, updating with experiments, as well as hybrid active/passive vibration reduction treatments of those systems for their control (as an example let us cite the modeling of “vibration and noise devices” acting as physical interfaces such as visco/piezo layers). Therefore, attenuation of vibrations and

noise using smart materials such as piezoelectric and magnetorheological devices will be considered.

The purpose of this presentation will be to give a review synthesis of those aspects and perspectives.

Honors Reception

Sponsored by: *Committee on Honors*

5:30pm–6:30pm

Ballroom A Foyer,

David L. Lawrence Convention Center

All registered attendees are invited to attend this reception and meet this year's Honors Awards Recipients.

Honors Assembly

6:30pm–7:30pm

Ballroom A, David L. Lawrence Convention Center

All registered attendees are cordially invited to attend the 2018 ASME Honors Assembly. This multimedia program celebrates some of today's leading engineers, educators, entrepreneurs, and innovators. This year's Honors Awards Recipients are:

ASME MEDAL

Thomas J.R. Hughes, Ph.D., Fellow
The University of Texas at Austin

For the pioneering development of computer-aided engineering and design technologies disseminated in industrial and commercial software used throughout the world, thereby improving engineering product development; and for originating and leading new fields of computational engineering research.

HONORARY MEMBER

Portonovo Ayyaswamy, Ph.D., Fellow
University of Pennsylvania

For exceptional contributions to mechanical engineering through a career marked with seminal and groundbreaking research scholarship, which has engendered transformational technology transfer for diverse applications; and for exemplary professional service to the worldwide scientific and practicing thermal engineering community.

HONORARY MEMBER

Alan Needleman, Ph.D., Fellow
Texas A&M University

For pioneering research in the fields of computational mechanics and computational materials science.

HONORARY MEMBER

Robert M. Nerem, Ph.D., Fellow

For outstanding contributions to the understanding of dynamics of blood flow and blood vessels in health and disease, and the development of tissue engineering for palliative care; and for leadership in bridging and creating opportunities for engineers to play a vital role in advancing medicine.

HONORARY MEMBER

Frank E. Talke, Ph.D., Fellow
University of California, San Diego

For contributions to information storage technology, color ink jet printing, and medical device technology.

M. EUGENE MERCHANT MANUFACTURING MEDAL OF ASME/SME

Kamlakar Rajurkar, Ph.D., Fellow
University of Nebraska – Lincoln

For pioneering contributions to enhance the productivity of nontraditional machining processes used in automobile, aerospace, and medical device manufacturing, including electrical discharge machining and electrochemical machining at macro-, micro-, and nanoscales, through extensive research in process modeling and in sensing and control techniques.

MELVIN R. GREEN CODES & STANDARDS MEDAL

Richard William Barnes, Fellow
ANRIC Enterprises Inc.

For distinguished leadership and professionalism in the research, development, promotion, acceptance, and application of ASME codes and standards; and for direct senior management involvement in the design, construction, and operational support of nuclear power plants.

NANCY DELOYE FITZROY AND ROLAND V. FITZROY MEDAL

Ivar Giaever, Ph.D., Member
Applied BioPhysics, Inc.

For innovative experimental work in superconductor tunneling that led to a major advance in the understanding of the phenomenon of superconductivity and to new scientific instruments.

RALPH COATS ROE MEDAL

Gwynne Shotwell
SpaceX

For outstanding leadership in innovation for space commercialization and colonization; for technical contributions to the design of reusable rockets; and for dedication to the promotion of STEM education.

TUESDAY, NOVEMBER 13

ME/MET Department Heads Professional Development Workshop

10:30am–12:00pm
Westmoreland Central & East,
Second Floor, The Westin Hotel

As part of our ongoing effort to provide resources and development opportunities for department heads/chairs, this workshop will explore many topics. Examples from previous workshops are becoming a department head/chair, funding priorities and how to handle budget cuts as well as development, fund-raising, and alumni engagement.

Heat Transfer Division Awards Luncheon

Sponsored by: *Heat Transfer Division*

11:45am–1:45pm
Pennsylvania East & West,
Second Floor, The Westin Hotel

Ticket: \$50

HTD Memorial Award (Science): Dr. Li Shi

HTD Memorial Award (General): Dr. Timothy Fisher

HTD Memorial Award (Art): Dr. M. Pinar Mengüç

Bergles-Rosenhow Young Investigator Award: Dr. Asegun Henry

Guest Luncheon

Sponsored by: *ASME Auxiliary – Celebrating 95 Years!*

1:00pm–3:00pm
Westmoreland West, Second Floor, The Westin Hotel

Ticket: \$40

The ASME Auxiliary welcomes ASME members to an afternoon of great food and refreshments at its semi-annual Guest Luncheon.

The ASME Auxiliary’s guest speaker and past scholarship winner will be Vickie Webster-Wood, Ph.D. from Carnegie Mellon University. Dr. Webster-Wood’s presentation will be on “Living Machines: Bio-inspired, Bio-hybrid, and Organic Robots.” Please join us for this exciting presentation.

Symposium for New and Prospective Faculty: Tips for Tenure and Promotion

1:30pm–3:00pm
Westmoreland Central & East,
Second Floor, The Westin Hotel

This workshop is designed for junior faculty, postdocs, and Ph.D. students. There will be a panel discussion in which the panel will share insights into the job search, promotion, and the tenure process. The panelists will provide recommendations from their own experience, including best practices and what to avoid. They will also answer questions from the audience.

SPECIAL EVENTS TUESDAY

Materials Division Sia Nemat-Nasser Award Lectures 3:45pm–4:45 pm Room 409, David L. Lawrence Convention Center

Tak-Sing Wong, *Department of Mechanical and Nuclear Engineering and Materials Research Institute, The Pennsylvania State University, University Park, Pennsylvania*



Tak-Sing Wong is currently an assistant professor of mechanical engineering and biomedical engineering and the inaugural holder of Wormley Family Early Career Professorship in Engineering at The Pennsylvania State University. Dr. Wong was a Croucher Foundation Postdoctoral Fellow at the Wyss Institute for Biologically Inspired Engineering at Harvard University. He received his Ph.D. (2009) in the Mechanical and Aerospace Engineering Department at UCLA and his B.Eng. (2003) in Automation and Computer-Aided Engineering from The Chinese University of Hong Kong. Dr. Wong's research focuses on surface and interface, micro- and nanomanufacturing, as well as designing multi-functional biologically inspired surfaces with applications in water, energy, and health. His research has been published in *Nature*, *Nature Materials*, *Nature Communications*, *PNAS*, and *Science Advances*. His work on bio-inspired materials has been recognized with a R&D 100 Award, a National Science Foundation CAREER Award, a DARPA Young Faculty Award, as well as an invitation to the National Academy of Engineering's U.S. Frontiers of Engineering symposium. Dr. Wong has also been named one of the world's top 35 Innovators Under 35 (formerly TR35) by *MIT Technology Review* and was recognized with the IEEE Nanotechnology Council Early Career Award in Nanotechnology and the ASME Sia Nemat-Nasser Early Career Award for his contributions in bioinspired materials engineering.

Title: Interfacial Engineering Inspired by Nature

Yihui Zhang, *Department of Engineering Mechanics, Tsinghua University, Beijing*



Yihui Zhang is an Associate Professor of Engineering Mechanics at Tsinghua University. He received his Ph.D. in engineering mechanics from Tsinghua University in 2011. Then he worked as a Postdoctoral Fellow from 2011 to 2014 and as a Research Assistant Professor from 2014 to 2015, both at Northwestern University. He joined the Department of Engineering Mechanics at Tsinghua University in 2015 and was tenured in 2018. His research interests include mechanically guided 3D assembly, soft composite materials, and stretchable electronics. He has published more than 90 peer-reviewed journal papers, including two in *Science*, eleven in *Nature* sister journals, three in *Science Advances*, four in *PNAS*, eight in the *Journal of the Mechanics and Physics of Solids*, three in *ACS Nano*, and eight in *Advanced Functional Materials*. His recent awards include ASME Sia Nemat-Nasser Early Career Award (2018), Society of Engineering Science's Young Investigator Medal (2018), Eshelby Mechanics Award for Young Faculty (2017), ASME

Melville Medal (2017), Journal of Applied Mechanics Award (2017), MIT Technology Review's 35 Innovators Under 35 (TR35 Award) (2016), and Qiu Shi Outstanding Young Scholar Award (2016). He is an associate editor of the *Journal of Applied Mechanics* (ASME Transactions), and serves on the editorial board of several academic journals, including *Proceedings of the Royal Society A* and *npj Flexible Electronics*.

Title: Bio-inspired Soft Network Materials With Unusual Mechanical Properties

Materials Division Nadai Medal Award Lecture 4:45pm–5:45pm Room 410, David L. Lawrence Convention Center

The Nadai Medal goes to **George M. Pharr** for "Measurement of Power Law Creep Parameters by Nanoindentation"



George M. Pharr is TEES Eminent Research Professor in the Department of Materials Science and at Texas A&M University, College Station, TX. He received his B.S. in Mechanical Engineering at Rice University in 1975 and Ph.D. in Materials Science and Engineering from Stanford in 1979. After one year of postdoctoral study at the University of Cambridge, England, he returned to Rice in 1980 as a faculty member in the Department of Mechanical Engineering and Materials Science. He moved to the Department of Materials Science and Engineering at the University of Tennessee (UT) in 1998, where he served as Chancellor's Professor and McKamey Professor of Engineering. While at UT, he also held a Joint Faculty Appointment at the Oak Ridge National Laboratory (ORNL), was Head of the UT Materials Science and Engineering Department, and served as the Director of the UT/ORNL *Joint Institute for Advanced Materials*. He joined the faculty of Texas A&M in January 2017.

Dr. Pharr received ASM International's Bradley Stoughton Award for Young Teachers of Metallurgy in 1985. His honors also include the Amoco Award for Superior Teaching at Rice University (1994), a Humboldt Senior Scientist Award (2007), the Materials Research Society's inaugural Innovation in Materials Characterization Award (2010), and the University of Tennessee Macebearer Award (2015). He is a member of the National Academy of Engineering (2014) and a Fellow of ASM International (1995), the Materials Research Society (2012), and TMS (2016). Dr. Pharr has been an Associate Editor of the *Journal of the American Ceramic Society* since 1990 and Principal Editor of the *Journal of Materials Research* since 2012. He is an author or co-author of more than 200 scientific publications, including four book chapters. His research focuses on mechanisms of plasticity and fracture in solids, especially at small scales.

Measurement of Power Law Creep Parameters by Nanoindentation

Great progress has been made over the past decade in making mechanical property measurements at small scales by load-

and depth-sensing indentation methods, also known as nanoindentation. The ability to make such measurements with sharp pyramidal indenters allows for high point-to-point spatial mapping of properties as well as the characterization of very thin films, thin surface layers, and even small particles or individual phases in complex multiphase microstructures. Although most nanoindentation testing has been done at room temperature, recent advances in nanoindentation testing equipment have expanded the horizons to very high temperatures, thus paving the way for the small-scale measurement of parameters characteristic of time-dependent creep deformation, such as the stress exponent, n , and the activation energy, Q_c . However, in doing so, serious experimental difficulties are often encountered, and how one converts the data obtained in nanoindentation tests to the parameters normally used to characterize uniaxial creep is not at all straightforward because of the complex, nonuniform stress state produced during indentation contact.

In this presentation, we report on progress in making meaningful measurements of power law creep by nanoindentation based on recent experience with a new high temperature nanoindentation system capable of testing at temperatures up to 1100°C. Special attention is given to the models and data analysis procedures needed to convert nanoindentation load-displacement-time data into the creep parameters normally measured in uniaxial tension or compression testing. The models and procedures are evaluated by comparison to several sets of creep data in which the material behavior has been probed both by nanoindentation and by uniaxial testing methods.

AESD Lecture and Reception

5:00pm–7:00pm

Room 411, David L. Lawrence Convention Center

Frank Kreith Energy Award

William M. Worek, *Department of Mechanical and Industrial Engineering, Texas A&M University—Kingsville, Texas*



William M. Worek is Professor of Mechanical Engineering at Texas A&M University—Kingsville, TX. He received all three degrees, B.S., M.S. and Ph.D. from the Illinois Institute of Technology in 1976, 1977 and 1980.

He spent a majority of his career at the University of Illinois—Chicago, where he was Department Head of Mechanical and Industrial Engineering and Director of the Energy Resources Center.

He has been involved, over the last 35 years, in the development of desiccant materials for cooling systems applications, modeling of sorption processes, experimental testing of desiccant material performance and the use of desiccant processes in the design of cooling and dehumidification systems. He holds three patents on sorption system design improvements and has published extensively in archival journals and has given numerous lectures on the subject. Recently he has expanded his research to investigate the enhancement when nanofluids are boiled.

Professor Worek was chair of the American Society of Mechanical Engineer's (ASME's) Solar Energy Division, Vice-President of ASME's Energy Resources Group and served as a Member of ASME's Board of Governors. In addition, he is Fellow of ASME and ASHRAE and has received Edwin F. Church Medal from ASME recognizing his accomplishments in engineering education. In addition, Professor Worek Co-editor of Mark's Handbook for Mechanical Engineering, Executive *Editor of Applied Thermal Engineering* and Editor-in-Chief of *Heat Transfer – Asian Research*.

Title: Challenges in Comfort Cooling: Separating Sensible and Latent Loads—Material Constraints and New Opportunities

As buildings have become tighter and as Net Zero Energy Buildings are designed and implemented, the latent cooling load has increased, and improved performing heating systems are desired. This presentation will present the status of current technologies and the efforts to improve performance and the capacity per unit volume (i.e., minimization of footprint) of heating and cooling systems. Conventional heating systems have limited efficiencies, many times less than one. Likewise, thermally-activated cooling/dehumidification systems also have relatively poor efficiencies. This presentation will focus on work done and new developments in materials and systems that are showing that performance can be significantly improved.

Applied Mechanics Koiter Lecture

5:30pm–6:30pm

Room 408, David L. Lawrence Convention Center

Professor M. Taher A. Saif, *Edward William and Jane Marr Gutsell Professor at the University of Illinois Urbana–Champaign*



Professor M. Taher A. Saif received his B.S. and M.S. in Civil Engineering from Bangladesh University of Engineering and Technology and Washington State University, respectively, in 1984 and 1986. He obtained his Ph.D. in Theoretical and Applied Mechanics from

Cornell University in 1993. He worked as a Post Doctoral Associate in Electrical Engineering and the National Nanofabrication Facility at Cornell University during 1993–1997. He joined the Department of Mechanical Science and Engineering at the University of Illinois at Urbana–Champaign (UIUC) during 1997. He is currently the Gutsell Professor in the department. He is serving as the Associate Head of Graduate Programs and Research.

Two of Saif's major contributions are: (1) discovery of plastic strain recovery in nano grained metals and its underlying mechanism. The finding opens the possibility of developing self-healing metal components; (2) discovery of mechanical tension in neurons in vivo, and the link between this tension and neurotransmission. This latter finding links mechanical force with memory and learning in animals. His current research includes tumor micro environment, mechanics of neurons and cardiac cells, development of biological machines, and electro-thermo-mechanical behavior of nanoscale metals and semiconductors.

SPECIAL EVENTS TUESDAY / WEDNESDAY

Saif is a Fellow of the American Society of Mechanical Engineers since 2011. He served as the President of the Society of Engineering Science during the calendar year 2016. He was a member of the Scientific Advisory Board, Singapore-MIT Alliance for Research and Technology during 2010–2012. He received the Xerox Award for Faculty Research from University of Illinois at Urbana–Champaign (UIUC) during 2003 and 2006. He was a Willett Faculty Scholar, College of Engineering, UIUC, during 2003–2009.

Title: Living Machines

The industrial revolution of the 19th century marked the onset of the era of machines that transformed societies. However, all of these machines are non-living and they do not have inherent intelligence. On the other hand, since the discovery of genes, there is a considerable body of knowledge on engineering living cells. It is thus appropriate to envision biohybrid machines that are made from engineered scaffolds and living cells. These machines have the potential of unprecedented capabilities, as they would carry the footprints of millions of years of evolution. These machines may emerge from an interaction between the living cells and the micro-nano scaffolds. In this talk, we will present such an elementary machine, a small scale swimmer, consisting of a soft slender string and rat cardiomyocytes. The string is made from a soft polymeric material by filling a microfabricated channel using capillary draw. Cells are cultured on one region of the string. These cells interact with the string as well as with each other and beat in synchrony as a single actuator. This living actuator bends the string, and a bending wave propagates from the actuator site toward the end, generating sufficient thrust for swimming. This artificial machine thus swims in fluids as the engineered living swimmer. These swimmers might be used in vivo for autonomous intelligent drug delivery.

Noise Control and Acoustics Division Wine & Cheese Reception

Sponsored by: *Noise Control and Acoustics Division*
5:30pm–7:00pm
Somerset East, Second Floor, The Westin Hotel

Women in Engineering Reception

Sponsored by: *Diversity & Inclusion Strategy Committee*
5:30pm–7:00 pm
Crawford East & West, Third Floor, The Westin Hotel

The reception provides a focal point at the conference for a gathering of women from the wide range of ASME activity for networking and a bit of casual relaxation at the end of a conference day. The event is open to all ASME women engineers and engineering students.

Materials Division Reception

Sponsored by: *Materials Division*
6:00pm–8:00pm
Room 409, David L. Lawrence Convention Center

Fluids Engineering Division Reception

Sponsored by: *Fluids Engineering Executive Committee*
6:30pm–8:30pm
Pennsylvania West, Second Floor, The Westin Hotel

Applied Mechanics Division Honors & Awards Banquet

Sponsored by: *Applied Mechanics Division*
7:00pm–10:00pm
Westmoreland Central & East, Second Floor, The Westin Hotel

Tickets: \$88

The evening's events will include honoring and presenting the following AMD awards to:

Thomas J.R. Hughes Young Investigator Award: Liping Liu

Ted Belytschko Applied Mechanics Award: Tayfun Ersin Tezduyar

Thomas K. Caughey Dynamics Award: Firdaus E. Udawadia

Daniel C. Drucker Medal: David M. Barnett

Warner T. Koiter Medal: M. Taher A. Saif

Timoshenko Medal: Ares J. Rosakis

Journal of Applied Mechanics Best Paper Award: Charles Wojnar

Lloyd H. Donnell Applied Mechanics Reviews Paper Award: Tevis D. B. Jacobs and Ashlie Martini

WEDNESDAY, NOVEMBER 14

Plenary Presentation

8:00am–8:45am
(breakfast served from 7:30am to 8:00am)
Ballroom A, David L. Lawrence Convention Center

Mark Hindsbo

Vice President and General Manager, Design Business Unit, ANSYS

Presentation Title: Innovation in Engineering

Democratization of technology, from the printing press to the graphical user interface of the PC, has driven profound changes to society and innovation. Many of these innovations were driven by engineers, and now engineering technologies themselves are being democratized. Powerful tools such as simulation on-demand manufacturing, for decades the domain of highly specialized experts, are becoming accessible to all.

Industry veteran Mark Hindsbo will discuss how this new paradigm is reshaping engineering, from the classroom to the workplace



Presenter Biography: **Mark Hindsbo** is the Vice President and General Manager of the Design Business Unit at ANSYS, on a mission to deliver “simulation for every engineer and every product.” He has a broad set of business and technical experiences across

sales, marketing, business strategy, software development, and physics. Mark originally joined ANSYS as the Vice President of Marketing in June 2015. Prior to ANSYS, he was most recently the Sr. Vice President of Customer Success at Parallels. He spent over 10 years at Microsoft in roles ranging from General Manager in the Server and Tools business group, to Vice President of the Developer business in the US. Prior to this, he was at The Boston Consulting Group, co-founded a digital agency, and did scientific computing at Novo Nordisk. He holds a Master of Science from the Technical University of Denmark and has done nuclear research at CERN.

NSF-CMMI Overview and Outreach Panel

8:00am–9:45am

Room 411, David L. Lawrence Convention Center

In the first part of this panel, an overview of the Civil, Mechanical and Manufacturing Innovation (CMMI) division will be provided with emphasis on recent changes in organizational structure as well as funding opportunities, e.g., the new no-deadline rule. Relevant core programs from the Advanced Manufacturing Cluster, the Mechanics & Engineering Materials Cluster, and the Resilient and Sustainable Infrastructures Cluster will also be highlighted. In the second part of the panel, the floor will then be opened to participants to address program directors representing these clusters.

2018 IMECE Feedback Session

10:00am–11:00am

Room 408, David L. Lawrence Convention Center

NSF One-on One Meetings

10:00am–5:30pm

NSF one-on-one meeting are arranged by appointment. For schedule changes and cancellations, please go to the Meeting Information desk on the third floor of the David L. Lawrence Convention Center.

NSF Proposal Development Workshop

10:15am–12:15pm

Room 411, David L. Lawrence Convention Center

In this workshop, the fundamentals of successful grant proposal writing for the National Science Foundation (NSF) will be covered. Participants will learn about key topics, including

the components of a successful proposal and finding the right home for the research. Critical aspects of the merit review process, funding profiles, and NSF programs, solicitations, and other opportunities will be presented. This workshop is geared toward early career investigators at U.S. institutions seeking to understand the NSF merit review process, but the information provided will be valuable to principal investigators in any stage of their career seeking to learn more about proposal writing and NSF funding opportunities.

Robert Henry Thurston Lecture

11:00am–12:00pm

Room 410, David L. Lawrence Convention Center

Title: **Dynamic Behavior of Materials at High-Strain Rates and High-Pressures**

Thurston Lecture Award to Guruswami (Ravi) Ravichandran for pioneering contributions to dynamic behavior of materials and development of novel experimental methods.

Dr. Guruswami Ravichandran, *John E. Goode, Jr., Professor of Aerospace and Mechanical Engineering, Division of Engineering and Applied Science California Institute of Technology*



Guruswami (Ravi) Ravichandran is the John E. Goode, Jr., Professor of Aerospace and Mechanical Engineering and the Otis Booth Leadership Chair of the Division of Engineering and Applied Science at the California Institute of Technology. He received

his B.E. (Honors) in Mechanical Engineering from the University of Madras and his Sc.M. in Engineering and Applied Mathematics and Ph.D. in Engineering (Solid Mechanics and Structures) from Brown University. He has held visiting scholar appointments at Ecole Polytechnique, France (CNRS Senior Scientist), Tokyo Institute of Technology (Chair in International Cooperation), and Indian Institute of Science (Aditya Birla Chair). He is a member of the National Academy of Engineering, Academia Europea, and European Academy of Sciences and Arts. He is a Fellow of the American Society of Mechanical Engineers (ASME), Society for Experimental Mechanics (SEM), and American Academy of Mechanics (AAM). He was named Chevalier de l'ordre des Palmes Academiques by the Republic of France. His awards include A.C. Eringen Medal from the Society of Engineering Science, Warner T. Koiter Medal from ASME, and William M. Murray Lecture Award from SEM. His research interests include mechanics of materials (deformation, damage, and failure), dynamic behavior, wave propagation, composites, active materials, micro-/nanomechanics, biomaterials and cell mechanics, and experimental methods.

Title: **Dynamic Behavior of Materials at High-Strain Rates and High Pressures**

Impact, blast, and other dynamic loading events are of significance in numerous engineering applications ranging from aerospace to automotive to defense to security to space.

SPECIAL EVENTS WEDNESDAY / THURSDAY

At the heart of transient loading events are the propagation of stress/shock waves, which can cause significant deformation and catastrophic damage and failure. This lecture will focus on the dynamic behavior of materials, in particular, their high-strain rate and high-pressure properties. Experimental methods based on the split Hopkinson (Kolsky) compression bar and the plate impact technique are reviewed. These experimental methods have been used to investigate the dynamic material behavior under extreme conditions, strain rates ~1 million/s, and pressures ~100 GPa. Studies on the constitutive behavior of ductile metals using the shear-compression specimen are discussed. In situ temperature measurements using high-speed infrared thermography are used to determine the fraction of plastic work converted to heat. A plate impact technique based on the Mach lens concept to achieve high pressures is illustrated. For a given impact velocity, this technique can help increase the range of pressures for determining the equation of state for materials. Shock wave experiments in heterogeneous materials illustrating their ability to mitigate damage through dispersion are presented. Material parameters controlling the rise time of the shock and the effective viscosity are identified. Theoretical analysis and numerical simulations are used to gain insights into shock wave propagation in heterogeneous composite materials.

NSF-CBET Program Overview and Initiatives

1:30pm–3:15pm

Room 411, David L. Lawrence Convention Center

In this event, an overview of the Chemical, Bioengineering, Environmental, and Transport Systems (CBET) Division will be provided with emphasis on programs and funding opportunities. The floor will then be opened to participants to ask questions.

NSF Student Competition (Posters Only)

Hall B, David L. Lawrence Convention Center

Poster Setup	10:00am–11:45am
General Viewing/Judging	11:45am–2:30pm
Awards	2:30pm–3:00pm

Virtual Podium (Posters Only)

Poster Setup	10:00am–11:45am
General Viewing	11:45am–2:30pm

2019 IMECE Track Organizers and Co-Organizers Meeting

3:00pm–4:00pm

Room 409, David L. Lawrence Convention Center

IMECE Volunteer and Student Recognition Reception

5:30pm–7:00pm

Westmoreland Central,
Second Floor, The Westin Hotel

Aerospace Division Reception

Sponsored by: Aerospace Division

5:45pm–7:15pm

Pennsylvania West, Second Floor, The Westin Hotel

THURSDAY, NOVEMBER 15

Closing Plenary Lunch

12:40pm–2:00pm

(lunch served from 12:40pm to 1:10pm)

Ballroom A, David L. Lawrence Convention Center

Vijay Kumar

Nemirovsky Family Dean of Penn Engineering, University of Pennsylvania

Presentation Title: AI, Robotics, Automation, and the Future of Work

We are living in a world where exponential growth in computing, communication, and storage are driving a new irrational exuberance in technology. The graduating engineers in 2018 will see computers that are six orders of magnitude faster than when they were born. Clearly no exponential can be forever! But there is no doubt that this growth is leading to automation, which is already having a transformational effect on our society. What does this mean for the future of mechanical engineering and related disciplines? This talk will debate the basis for the irrational exuberance, especially in the area of autonomous drones and self-driving cars, and opportunities for engineers and engineering education.



Presenter Biography: **Vijay Kumar** is the Nemirovsky Family Dean of Penn Engineering with appointments in the Departments of Mechanical Engineering and Applied Mechanics, Computer and Information Science, and Electrical and Systems

Engineering at the University of Pennsylvania. Since 1987, he has served Penn Engineering in many capacities, including Deputy Dean for Research, Deputy Dean for Education, Chairman of the Department of Mechanical Engineering and Applied Mechanics, and Director of the GRASP Laboratory, a multidisciplinary robotics and perception laboratory. Dr. Kumar has served as the assistant director of robotics and cyber physical systems at the White House Office of Science and Technology Policy (2012–2013). He received his Bachelor of Technology degree from the Indian Institute of Technology, Kanpur and his Ph.D. from The Ohio State University in 1987.

Dr. Kumar maintains an active research portfolio with interests in robotics, specifically multi-robot systems, and micro aerial vehicles. He is a Fellow of the American Society of Mechanical Engineers (2003), a Fellow of the Institute of Electrical and Electronic Engineers (2005), and a member of the National Academy of Engineering (2013). Dr. Kumar is also the recipient of the 1991 National Science Foundation Presidential Young Investigator award, the 1996 Lindback Award for Distinguished

Teaching (University of Pennsylvania), the 1997 Freudenstein Award for significant accomplishments in mechanisms and robotics, the 2012 ASME Mechanisms and Robotics Award, the 2012 IEEE Robotics and Automation Society Distinguished Service Award, a 2012 World Technology Network Award, a 2014 Engelberger Robotics Award, and the 2017 IEEE Robotics and Automation Society George Saridis Leadership Award in Robotics and Automation.

HONORING SYMPOSIA

MONDAY, NOVEMBER 12 9:45am–11:30am;
1:45pm–3:30pm; 3:45pm–5:30pm, Room 324
David L. Lawrence Convention Center

Topic 10-60 Symposium in Honor of Prof. Frank Kreith

This Symposium is organized in honor and memory of the late Professor Frank Kreith, NAE, ASME Honorary Member, ASME Medal and to celebrate his life, legacy, and the many years of service and contributions in heat transfer, solar energy, alternative energy, and sustainability, which have bridged research in mechanical engineering with applications in most other engineering disciplines.

HONORING SYMPOSIA

WEDNESDAY, NOVEMBER 14
1:45pm–5:30pm, Room 326
David L. Lawrence Convention Center

Topic 9-8 Kirti (Karman) Ghia Celebration of Life Symposium

Over the past five decades, Professor Kirti (Karman) Ghia made significant contributions to ASME, AIAA, and APS fluids activities through his research publications, conference and session organization, and committee administration. Karman was an effective teacher and researcher of Computational Fluid Dynamics and has published extensively on a number of topics. We as a community were saddened to learn of Karman's passing on June 13, 2017, following a sudden illness. This symposium has been organized to celebrate his life as a distinguished member of our fluids community.

HONORING SYMPOSIA

WEDNESDAY, NOVEMBER 14
3:45pm–5:30pm, Room 318
David L. Lawrence Convention Center

Topic 7-9 Pre-College (K-12) STEM, RET – University, School and Industry Alliance (In Honor of Late Professor Devdas Pai)

This topic welcomes K-12 outreach efforts by universities and their industry partners. Modules of research and principles of engineering presented to the middle and high school students and teachers will be particularly beneficial to the audience. Similarly, outreach to high school students in the form of innovative engineering activities on college campuses can also be presented to the peers attending the sessions. Research Experiences for Teachers would be appropriate under this topic.

HONORING SYMPOSIA

THURSDAY, NOVEMBER 15
8:55am–12:35pm, Room 306
David L. Lawrence Convention Center

Topic 3-6 Lightweight Sandwich Composites and Layered Structures – (In Honor of Prof. Frostig)

This symposium will bring together prominent investigators in the areas of sandwich structures and multilayered composites honoring the outstanding contribution of Professor Yehoshua (Shuki) Frostig from the Technion – Israel Institute of Technology to applied mechanics in general, and particularly, to higher-order theories of sandwich structures. Theoretical models developed by Professor Frostig provide an accurate analytical tool to characterize the global and local response of sandwich structures, accounting for realistic deformations in the core. These contributions have been verified and universally accepted for the characterization of the response of sandwich structures to both global and local loads. The colleagues of Professor Frostig will present their original work pertinent to the areas of his research in acknowledgement of his original and valuable studies that have a lasting and prominent effect in our field of mechanics.



Track Plenary

Track 1: Acoustics, Vibration, and Phononics

1-13-1: ACOUSTICS, VIBRATION, AND PHONONICS PLENARY

Tuesday, November 13, 8:00am–8:45am
Room 305, David L. Lawrence Convention Center

Active Acoustic Metamaterials (IMECE2018-90090)

Amr Baz

University of Maryland, College Park

Abstract: A class of active acoustic metamaterials (AAMM) is developed with desirable controlled distributions of effective dynamic properties or intensity of wave propagation. The proposed AAMM consists of an array of acoustic cavities separated by piezoelectric boundaries and arranged to form acoustic waveguides. The flexible piezoelectric boundaries are controlled to generate desirable acoustic properties or wave energy distribution along the wave guide in an attempt to develop acoustic cloaks or non-reciprocal diodes. Robust control strategies are formulated to achieve the desirable closed-loop control characteristics of this class of acoustic metamaterials while rejecting the effect the external wave pressure disturbances. The time response characteristics of the AAMM are investigated and presented for various parameters of the robust controllers in order to demonstrate the merits of the proposed controllers. Applications of the proposed work are outlined, ranging from exterior and interior acoustic cloaks to non-reciprocal switching acoustic metamaterials.



Bio: Dr. Amr Baz is a Minta Martin Professor of Mechanical Engineering and the Director of the Smart Materials and Structures Research Center at the University of Maryland, College Park. He holds a B.Sc.'66 from Cairo University, as well as M.Sc.'70 and Ph.D.'73

from the University of Wisconsin, Madison. Dr. Baz's research interests span the areas of active and passive control of vibration and noise using smart structures, constrained layer damping treatments to control sound radiation in structures, as well as active acoustic metamaterials. Dr. Baz has published more than 150 archival journal papers, seven book chapters, and holds nine US patents. He is a Fellow of the American Society of Mechanical Engineers and a recipient of Egypt's Presidential Award & First Class Medal for Best Achievements in Science and Arts. Dr. Baz received the ASME Adaptive Structures and Material Systems Prize (2009), the Pi-Tau-Sigma Purple Cam-Shaft Teaching Award (2009), the SPIE Smart Structures Lifetime Achievement Award (2011), the Poole and Kent Teaching Award (2015), as well as the Distinguished Scholar award from UMD (2015). He serves on the editorial boards of the following journals: *Journal of Vibration and Control*, *Smart Structures and Systems*, and *Mechanics of Advanced Materials and Structures*. He also served as Chairman of the ASME National Capital Chapter (1990–1991), Member of ASME Edwin Church Medal Award (1993–2002), and Chair and Co-Chair of the SPIE Smart Structures and Integrated Systems Conference (2002–2003).

Track 2: Advanced Manufacturing

2-1: ADVANCED MANUFACTURING PLENARY

Wednesday, November 14, 9:00am–9:45am
Room 305, David L. Lawrence Convention Center

Manufacturing for X (IMECE2018-90091)

Jian Cao

Northwestern University

Abstract: The future of manufacturing is envisioned to be a mixture of customized manufacturing and concentrated manufacturing. To enable the versatility of manufacturing processes and to fully integrate design and manufacturing for system optimization, at the Advanced Manufacturing Processes Laboratory of Northwestern, research efforts are rooted in discovering new processes and enhancing the predictability of manufacturing processes using the ICME (integrated computational materials engineering) approach. This talk will provide an overview about those activities and then focus on selective processes and their fundamentals, which may include metal-based powder-blown additive manufacturing, laser processes for surface texturing, electrospinning, dieless sheet forming, carbon-fiber reinforced composites forming, etc.



Bio: Dr. Jian Cao (MIT'95, MIT'92, SJTU'89) is the Cardiss Collins Professor, Director of Northwestern Initiative for Manufacturing Science and Innovation, and an Associate Vice President for Research (AVPR) at Northwestern University. She was at the

National Science Foundation as a program director for two years. Professor Cao is an elected Fellow of ASME, SME, and the International Academy for Production Engineering (CIRP). Her major awards include the Charles Russ Richards Memorial Award (2017) from ASME and Pi Tau Sigma, SME Frederick W. Taylor Research Medal (2016), ASME Blackall Machine Tool and Gage Award (2012, 2018), ASME Young Investigator Award (2006) from ASME Division of Applied Mechanics, and NSF CAREER Award. Prof. Cao is the Editor-in-Chief of *Journal of Materials Processing Technology*. She served as President of the SME North America Manufacturing Research Institute and Chair of ASME Manufacturing Engineering Division. She is a recipient of the ASME Dedicated Service Award (2011). As an AVPR, Prof. Cao fosters the collaboration between the physical sciences and engineering and the other disciplines across and beyond Northwestern. She is a Board member of mHUB, Chicago's first innovation center focused on physical product development and manufacturing.

Track 3: Advances in Aerospace Technology

3-20-1: ADVANCES IN AEROSPACE TECHNOLOGY PLENARY I

Wednesday, November 14, 9:00am–9:45am
Room 304, David L. Lawrence Convention Center

**Rapid, Physics-Based Reduced Order Modeling of
Nonlinear Aerodynamics**
(IMECE2018-90092)

Marilyn Smith

Georgia Institute of Technology

Abstract: The ability to rapidly obtain accurate static and unsteady loads and moments on complex aerodynamic and bluff bodies has been one of the major deficiencies in next generation vehicle design, including agile unmanned aerial systems (UAS) and in tethered loads analysis such as slung, crane, towed, and parachute configurations. Two reduced-order models (ROM) that build up complex shape simulation of quasi-steady loads and moments and then extend the quasi-steady analysis to unsteady applications have been developed. Because the ROMs are based on quasi-empirical theory, the methods are applicable to a wide range of configurations and rapid enough for use in early design and simulation tools. Validation with computations, wind tunnel experiments, and flight tests has demonstrated significant improvements in predictions over current approaches for design and analysis. Demonstrations include control law design for agile UAS and helicopter slung load handling qualities and stability analysis.



Bio: Dr. Marilyn Smith is a Professor in the School of Aerospace Engineering at the Georgia Institute of Technology and Associate Director of the Georgia Tech Vertical Lift Research Center of Excellence. She previously worked at Lockheed-Georgia Company

(Lockheed-Martin) and McDonnell-Douglas Helicopters (Boeing-Mesa). Her research encompasses computational unsteady aerodynamics and aeroelasticity for complex configurations. She is currently developing reduced-order models for nonlinear applications in active flow control, bluff bodies, and turbulence. She is a Technical Fellow of AHS and AIAA Fellow. She has twice been a team member for AHS AgustaWestland International Fellowship Awards and NASA Group Achievement Awards. She currently serves on the AHS Board of Directors and AHS Technical Council, as well as Associate Editor for the *Journal of Fluids and Structures*, *AIAA Journal*, *Journal of the American Helicopter Society*, and the *Aeronautical Journal*.

Track 3: Advances in Aerospace Technology

3-20-2: ADVANCES IN AEROSPACE TECHNOLOGY PLENARY II

Wednesday, November 14, 8:00am–8:45am
Room 305, David L. Lawrence Convention Center

**On the Flightpath to Adaptive Aerospace Structures:
Articulated Tensegrity**
(IMECE2018-90093)

George Lesieutre

Pennsylvania State University

Abstract: Adaptive structures are flying and the field is advancing. This talk will trace key developments in adaptive flight structures technology from circa 1970 to present-day. Such developments include advances in materials, devices, control, structural integration, and design—as well as applications to space and flight vehicles. Articulated tensegrity space structures provide a recent example. A novel deployment strategy for cylindrical tensegrity masts starts from a Class-1 configuration having high packaging efficiency and—through a multi-stage deployment process—ending as a Class-2 tensegrity having higher stiffness. Strut lengths are fixed and articulation is achieved via active cables. Design optimization revealed packaging efficiency and deployed stiffness exceeding that of existing technology, and an initial benchtop realization was demonstrated. The talk will also address the relatively slow process of technology maturation and adoption, and provide context from the historical development of aeronautical materials and structures. Continuing advances promise a bright future. Such advances include acoustic metamaterials for damping; energy harvesting, miniature sensors, and low-power electronics and software for conditioning monitoring and prognosis; and additive 3-D manufacturing for complex heterogenous structures.



Bio: Dr. George Lesieutre is Associate Dean for Research and Graduate Studies and Professor of Aerospace Engineering at Penn State. He recently completed terms as Department Head and Director of the Center for Acoustics and Vibration. He earned a B.S.

in Aeronautics and Astronautics from MIT and a Ph.D. in Aerospace Engineering from UCLA. Prior to joining Penn State, he held positions at SPARTA, Rockwell Satellite Systems, Allison Gas Turbines, and Argonne National Lab. His research interests include structural dynamics of aerospace systems, including passive damping, active structures, and energy harvesting. Dr. Lesieutre served as PI of several major DARPA programs in adaptive structures and has received five society best paper awards. He has advised more than 60 graduate students and has published more than 300 technical articles and patents. Dr. Lesieutre is a Fellow of AIAA, served a term on the AIAA Board of Directors, and served as General Chair of the AIAA Science and Technology Forum (SciTech 2015). An instrument-rated private pilot, he once paddled a canoe from Montreal to the Gulf of Mexico as part of a historical reenactment and, more recently, ran a 50-mile ultramarathon.

Track 4: Biomedical and Biotechnology Engineering

4-1-1: BIOMEDICAL AND BIOTECHNOLOGY PLENARY I

Wednesday, November 14, 9:00am–9:45am
Room 303, David L. Lawrence Convention Center

Acoustofluidics: Merging Acoustics and Microfluidics for Biomedical Applications

(IMECE2018-90094)

Tony Jun Huang
Duke University

Abstract: The past two decades have witnessed an explosion in lab-on-a-chip research with applications in biology, chemistry, and medicine. The continuous fusion of novel properties of physics into microfluidic environments has enabled the rapid development of this field. Recently, a new lab-on-a-chip frontier has emerged, joining acoustics with microfluidics, termed acoustofluidics. Here we summarize our recent progress in this exciting field and show the depth and breadth of acoustofluidic tools for biomedical applications through many unique examples, from exosome separation to cell-cell communications to 3D bioprinting, from circulating tumor cell isolation and detection to ultra-high-throughput blood cell separation for therapeutics, and from high-precision micro-flow cytometry to portable yet powerful fluid manipulation systems. These acoustofluidic technologies are capable of delivering high-precision, high-throughput, and high-efficiency cell/particle/fluid manipulation in a simple, inexpensive, cell-phone-sized device. More importantly, the acoustic power intensity and frequency used in these acoustofluidic devices are in a similar range as those used in ultrasonic imaging, which has proven to be extremely safe for health monitoring during various stages of pregnancy. As a result, these methods are extremely biocompatible; i.e., cells and other biospecimen can maintain their natural states without any adverse effects from the acoustic manipulation process. With these unique advantages, acoustofluidic technologies meet a crucial need for highly accurate and amenable disease diagnosis (e.g., early cancer detection and monitoring of prenatal health) as well as effective therapy (e.g., transfusion and immunotherapy).



Bio: Tony Jun Huang is William Bevan Professor of Mechanical Engineering and Materials Science at Duke University. Previously, he was a Professor and The Huck Distinguished Chair in Bioengineering Science and Mechanics at The Pennsylvania State University. He received his Ph.D. in Mechanical and Aerospace Engineering from the University of California, Los Angeles (UCLA) in 2005. His research interests are in the fields of acoustofluidics, optofluidics, and micro/nano systems for biomedical diagnostics and therapeutics. He has authored/co-authored over 190 peer-reviewed journal publications in these fields. His journal articles have been cited more than 11,000 times, as documented at Google Scholar (h-index: 59). He also has 20 patents and invention disclosures. He was elected a fellow of the following five professional societies:

the American Institute for Medical and Biological Engineering (AIMBE), the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the Institute of Physics (IOP), and the Royal Society of Chemistry (RSC). Huang's research has gained international recognition through numerous prestigious awards and honors, including a 2010 National Institutes of Health (NIH) Director's New Innovator Award; a 2012 Outstanding Young Manufacturing Engineer Award from the Society for Manufacturing Engineering; a 2013 American Asthma Foundation (AAF) Scholar Award; JALA Top Ten Breakthroughs of the Year Award in 2011, 2013, and 2016; the 2014 IEEE Sensors Council Technical Achievement Award from the Institute of Electrical and Electronics Engineers (IEEE); and the 2017 Analytical Chemistry Young Innovator Award from the American Chemical Society (ACS).

Track 4: Biomedical and Biotechnology Engineering

4-1-2: BIOMEDICAL AND BIOTECHNOLOGY PLENARY II

Wednesday, November 14, 8:00am–8:45am
Room 304, David L. Lawrence Convention Center

New Directions in Medical Ultrasound

(IMECE2018-90095)

Dr. Mostafa Fatemi
Mayo Clinic

Abstract: Traditional diagnostic ultrasound has evolved from a simple anatomical imaging tool to a sophisticated technology that involves quantifying tissue properties and function from molecular level to the organ level. Many disease processes cause microscopic changes in tissue that may include alteration of a tissue's mechanical properties and, in some cases, changes in microvasculature network. Ultrasonic methods for measuring such changes in the human body are of great interest. The fact that ultrasound is noninvasive and capable of making measurements at sufficient depths in the body makes this technology a prime candidate for developing new diagnostic tools. This talk will cover some new methodologies in medical ultrasound, including novel methods in estimating tissue viscoelasticity and new techniques for imaging microvasculature networks with high definition and studying their architecture in the targeted tissue.

Bio: Mostafa Fatemi received his Ph.D. in Electrical Engineering from Purdue University. Currently, he is a Professor of Biomedical Engineering at the Department of Physiology and Biomedical Engineering of Mayo Clinic College of Medicine in Rochester, MN. At the Mayo Clinic, he is also a member of the Mayo Clinic Cancer Center, Cancer Imaging Program, and the Center for Clinical and Translational Science. In addition, he is a Professor of the Biomedical Informatics and Computational Biology graduate program at the University of Minnesota Rochester. Dr. Fatemi's current research areas include ultrasonic methods for tissue viscoelasticity estimation and its applications in cancer imaging and bladder function evaluation. His past and current research activities have been funded by the National Institutes of Health, National Science Foundation, Department of Defense Medical Research Program, Komen

Breast Cancer Foundation, and Minnesota Partnership Program. He has published extensively in the field of medical ultrasound and holds 11 patents in this field. Dr. Fatemi has been awarded Fellow membership by these institutions: Institute of Electrical and Electronics Engineers (IEEE), American Institute of Medical and Biological Engineering (AIMBE), Acoustical Society of America (ASA), and American Institute of Ultrasound in Medicine (AIUM). He is also a recipient of the IEEE-UFFC Distinguished Lecturer award for 2016–2017.

Track 5: Design, Reliability, Safety, and Risk

5-19-1 DESIGN, RELIABILITY, SAFETY, AND RISK PLENARY

Tuesday, November 13, 8:00am–8:45am
Room 304, David L. Lawrence Convention Center

Autonomous Vehicle Safety: Tomorrow's Rewards versus Today's Reality (IMECE2018-90096)

Roger L. McCarthy
McCarthy Engineering

Abstract: No vehicle technology has caused more excitement, investment, than potential vehicle “autonomy” (SAE or NHTSA level 4 & 5). Since the “critical pre-crash event” of ~94% of U.S. traffic accidents is a “driver critical reason(s),” vehicles driven by a fast-autonomous agent that does not blink, sleep, drink, etc., spawn “predictions” of unprecedented safety impact. Autonomous vehicle potential to revolutionize western economies is inestimable. The 8% utilization of current automobiles could increase 10X as autonomous cabs. The vast tracts of real estate now dedicated to roadside parking, driveways, and garages could be reclaimed. Unfortunately, the “hype” surrounding all U.S. self-driving vehicles, even though they are using somewhat different technologies, significantly overstates the current capabilities of the technology, and the foreseeable improvements in the next few years, to operate on normal roads interacting with human drivers. This is apart from having no demonstrated ability in snow or rain. The early overall crash rates for self-driving prototype vehicles under ideal conditions has been less than promising, even though virtually always the fault of the other driver. Because of these challenges and issues of liability, security, and privacy, the most significant active accident prevention will increasingly result from the deployment of automatic “backup” systems that monitor the driver, automatically intervene to prevent crashes, but don’t actively drive. An example is 99% of new vehicles in the U.S. market by 2022 will have an automatic emergency braking (AEB) system.



Bio: Dr. Roger L. McCarthy is the founder and owner of McCarthy Engineering. Dr. McCarthy serves on the Board of Shui on Land (SOL), Ltd. (瑞安房地产), which is publicly traded (stock code 0272) on the Hong Kong Exchange. Dr. McCarthy was formerly employed by Exponent, Inc. (NASDAQ symbol “EXPO”), headquartered in Menlo Park, CA. Dr. McCarthy joined

Exponent, then Failure Analysis Associates, Inc., (FaAA) in 1978, and retired in 2009 where, during his 30+-year tenure, he was variously CEO, Chairman, and Chairman Emeritus. Dr. McCarthy has published extensively on vehicle accidents, using large scale vehicle accident databases to address questions of automotive design. In 2004, Dr. McCarthy was elected to the U.S. National Academy of Engineering (NAE) with the citation: “For major contributions to improved vehicle safety and for methods of quantitative assessment of the reliability of complex mechanical systems.” In 1992, then President Bush appointed Dr. McCarthy to a two-year term on the President’s Commission on the National Medal of Science. Dr. McCarthy holds a Ph.D. from the Massachusetts Institute of Technology (MIT) in Mechanical Engineering and four other academic degrees. Dr. McCarthy has investigated some of the major disasters of the current age, most recently the Deepwater Horizon Explosion, Fire, and Oil Spill in the Gulf of Mexico for Secretary of the Interior Salazar. He has appeared on The History Channel, Myth Busters, Discovery, Modern Marvels, and the National Geographic Channel.

Track 6: Dynamics, Vibration, and Control

6-1-1 DYNAMICS, VIBRATION, AND CONTROL PLENARY

Tuesday, November 13, 8:00am – 8:45am
Room 303, David L. Lawrence Convention Center

Complex Modal Decomposition for Traveling Waves and Nonsynchronous Oscillations (IMECE2018-90097)

Brian Feeny
Michigan State University

Abstract: Characteristic patterns of nonsynchronous oscillations and traveling waves can be described in terms of complex modes. We extract complex modes from data by using modal decompositions that are generalizations of proper orthogonal decomposition. These decomposition methods are based on the availability of sampled sensed quantities distributed across a structure of interest and may include, for example, displacements, velocities, and/or accelerations. An eigenvalue problem produces optimal weighted signal energy distributions that are interpreted as modes. Basic ideas of three methods are discussed, as is the use of complex modes and modal coordinates for quantifying features of nonsynchronous and traveling-wave motion. The methods are applied to a variety of systems, including structural wave propagation and bio-locomotion.



Bio: Brian Feeny is a Professor in the Department of Mechanical Engineering at Michigan State University. He received his B.S., M.S., and Ph.D. in Mechanics from the University of Wisconsin—Madison (1984), the Virginia Polytechnic Institute and State University (1986), and Cornell University (1990), respectively, and then held a postdoctoral position at the Institute of Robotics, ETH in Zurich, Switzerland. He is a Fellow of the American Society of Mechanical Engineers (ASME), for which

TRACK PLENARY

he has been an Associate Editor for the *Journal of Vibration and Acoustics* and *Journal of Computational and Nonlinear Dynamics*, and has served as chair of the ASME Technical Committee on Vibration and Sound. He is the director of his department's student exchange program between MSU and RWTH Aachen. His research interests are in dynamics and vibration, with current activities in nonlinear dynamics, modal decomposition, nonlinear waves, friction dynamics, and system identification, and with applications to wind turbines, pendulum vibration absorbers, and bio-locomotion.

Track 7: Engineering Education

7-13-1 ENGINEERING EDUCATION PLENARY

Wednesday, November 14, 9:00am–9:45am
Room 302, David L. Lawrence Convention Center

Lessons and Perspectives on Transformational Engineering Education: Past, Present, and Future
(IMECE2018-90098)

Harvey Borovetz

University of Pittsburgh

Abstract: This plenary talk is dedicated to Dr. Devdas Mizar Pai, a longtime contributor to the Engineering Education track at IMECE whose sudden demise on August 19, 2017 impacted us in many ways; his transformational vision of engineering education lives on. Drawing from his life, Dr. Borovetz will paint the vision for engineering education in the 21st century. The lack and the need of a Science, Engineering, Technology, and Mathematics (STEM) workforce has been emphasized more than ever by the many initiatives undertaken by the National Science Foundation, such as its STEM Scholarships for academically talented and financially disadvantaged students. There is quite a dearth of underrepresented minorities, including women, in mechanical engineering and other engineering disciplines. Numerous and diverse outreach programs in K-16 are quintessential in keeping the current generation of students engaged in our engineering education enterprise. These programs include student-mentor interaction, student-faculty interaction, peer learning, living learning communities, shadowing experiences with engineers in industry, and above all, inclusive excellence. Besides programs such as Research Experiences for Undergraduates and Teachers, we need to invest in Young Scholar Institutes to impact engineering education. The holistic development of graduates is an important theme to sustain the STEM workforce in the future. This talk will not only highlight Dr. Pai's many valuable contributions to STEM education and outreach and their impact, but also the lessons for us regarding inclusive excellence and other strategies to address challenges and sustain transformational engineering education programs nationwide.



Bio: Dr. Harvey Borovetz is a distinguished professor and former chair in the Department of Bioengineering, Swanson School of Engineering at the University of Pittsburgh. He holds several other professorships in numerous departments in both engineering and medicine. Dr. Borovetz is a Fellow of the American Institute

for Medical and Biological Engineering, a Fellow of the Council on Arteriosclerosis, American Heart Association, and Inaugural Fellow of the Biomedical Engineering Society (BES). He served on the BES Board of Directors. He led from the front on numerous cutting-edge research and education initiatives in engineering education working with colleagues across many U.S. institutions. Dr. Borovetz served on the Scientific Advisory Boards of the University of Louisville Speed Scientific School, the University of Massachusetts, the Departments of Bioengineering at Bucknell University, the Cleveland Clinic Foundation, UCLA, Rutgers University, and Pennsylvania State University. He has also served on numerous NIH and NSF study sections, as a member of the Literature Selection Technical Review Committee, National Library of Medicine, as an ad hoc reviewer on the Scientific Advisory Committee of the Whitaker Foundation, and as a reviewer for The Whitaker International Fellows and Scholars Program. Dr. Borovetz's current research interests are focused on the design and clinical utilization of cardiovascular organ replacements for both adult and pediatric patients. He will share examples of inclusive excellence from his role as Executive Director of an NSF Engineering Research Center. His many students in the STEM workforce, such as Dr. Mike Lowell, President of Marquette University, are a testament to his leadership in engineering education. Dr. Borovetz's distinguished record in engineering education includes many laurels, such as 2007 Carnegie Science Center Life Sciences Award and the 2016 Swanson School of Engineering Award for Diversity. He will springboard his vast experience to guide us in how we can transform engineering education for the students of the 21st century.

Track 8: Energy

8-17 ENERGY PLENARY

Tuesday, November 13, 8:00am–8:45am
Room 302, David L. Lawrence Convention Center

Thoughts on the Future of Power Generation: A Low Carbon Perspective
(IMECE2018-90099)

Ahmed F. Ghoniem

Massachusetts Institute of Technology

Abstract: Increasing environmental concerns related to energy use are driving systems for electricity generation toward low-carbon alternatives. This presentation summarizes current approaches and outlines future developments and research needs for transitioning towards sustainable electricity generation. The speaker will present information regarding renewables and CCS technologies, centralized and decentralized generation, and advanced energy conversion systems, and also highlighting the strategic role of forming future energy engineers in the field of advanced energy systems and approaches.



Bio: Ahmed Ghoniem the Ronald C. Crane Professor of Mechanical Engineering, Director of the Center for Energy and Propulsion Research and the Reacting Gas Dynamics Laboratory at MIT. He received his B.Sc. and M.Sc. degree from Cairo University, and Ph.D.

at the University of California, Berkeley. His research covers computational engineering with application to turbulence and combustion, multiphase flow and multiscale phenomena, clean energy technologies with focus on CO₂ capture, renewable energy and alternative fuels. His research has made fundamental contributions to multiscale simulations, thermochemistry, combustion dynamics, energy systems and materials chemistry. He supervised more than 100 M.Sc., Ph.D. and post-doctoral students, many are leaders in academia, industry and governments; published more than 500 refereed articles in leading journals and conferences; lectured extensively around the World; and consulted for the aerospace, automotive and energy industry. He is fellow of the American Society of Mechanical Engineer (ASME), the American Institute of Physics (APS), the Combustion Institute (CI), and associate fellow of the American Institute of Aeronautics and Astronautics (AIAA). He received several prestigious awards including the ASME James Harry Potter Award in Thermodynamics, the AIAA Propellant and Combustion Award, the KAUST Investigator Award and the Committed to “Committed to Caring Professor” at MIT.

Track 9: Fluids

9-17-1: FLUIDS ENGINEERING PLENARY I

Tuesday, November 13, 8:00am–8:45am

Room 301, David L. Lawrence Convention Center

Microfluidic Rheometry of Complex Fluids

(IMECE2018-90100)

Gareth H. McKinley

MIT

Abstract: The development and growth of microfluidics has stimulated interest in the behavior of complex liquids in microscale geometries and provided a rich platform for rheometric investigations of non-Newtonian material phenomena at small scales. Microfluidic techniques present the rheologist with new opportunities for measurement of fluid properties and enable the systematic investigation of strong elastic effects at very high deformation rates without the complications of fluid inertia. In this presentation, we provide an overview of the use of microfluidic devices to measure bulk rheology and onset of viscoelastic flow instabilities in both shear and extensional flows, using a combination of local velocimetric imaging, mechanical measurements of pressure drop, and full-field optical probes of flow-induced birefringence. Steady and time-dependent flows of a range of dilute polymer solutions and wormlike micellar fluids are considered. The ability to rapidly and precisely fabricate complex flow geometries also enables us to exploit the predictions of computational optimization and design, from first principles, an optimized shape cross-slot extensional rheometer (or OSCER) that achieves homogeneous planar

extensional kinematics and large fluid strains. Local birefringence measurements along the stagnation streamlines, combined with bulk measurements of the excess pressure drop across the device, provide self-consistent estimates of the extensional viscosity over a wide range of deformation rates up to 1000 s⁻¹. The results are also in close agreement with numerical simulations based on a finitely extensible nonlinear elastic (FENE) dumbbell model. As the imposed extension rate in the OSCER device is increased, the homogeneous planar elongational flow ultimately becomes unstable. High-frame rate video-imaging of the birefringence field is used to construct space-time diagrams of the evolution in the flow for seven different polymer solutions and to construct the first stability diagram for planar extensional flows in cross-slot devices. The mode of instability is found to depend on the elasticity number ($EI = Wi/Re$) of the fluid, with a steady symmetry-breaking purely-elastic bifurcation observed at high $EI \gg 1$, and time-dependent three-dimensional inertio-elastic instabilities dominant for $EI < 1$.



Bio: Gareth H. McKinley is the School of Engineering Professor of Teaching Innovation within the Department of Mechanical Engineering at MIT. He received his B.A. and M.Eng. from the University of Cambridge and his Ph.D. (1991) from the Chemical

Engineering Department at MIT. He taught in the Division of Engineering and Applied Sciences at Harvard from 1991 to 1997 and was an NSF Presidential Faculty Fellow from 1995 to 1997. He won the Annual Award of the British Society of Rheology in 1995 and the Frenkiel Award from the APS Division of Fluid Dynamics in 2001. He served as Executive Editor of the *Journal of Non-Newtonian Fluid Mechanics* from 1999 to 2009 and as Associate Editor of the *Journal of Fluid Mechanics* from 2007 to 2009. He most recently served as the Associate Department Head for Research of the Mechanical Engineering Department at MIT from 2008 to 2013. He is also a co-founder of Cambridge Polymer Group. His research interests include extensional rheology of complex fluids, non-Newtonian fluid dynamics, microrheology and microfluidics, field-responsive fluids, super-hydrophobicity, wetting of nanostructured surfaces, and the development of nanocomposite materials. He is the author of over 275 technical publications and was one of the winners of the 2007 Publication Award of the Society of Rheology. He is a Fellow of the American Physical Society and President of the U.S. National Committee of Theoretical and Applied Mechanics (USNC/TAM). He was the recipient of the 2013 Bingham Medal of the Society of Rheology and served as President of the Society from 2015 to 2017. Most recently, he won the 2014 Gold Medal of the British Society of Rheology.

Track 9: Fluids

9-17-2: FLUIDS ENGINEERING PLENARY II

Tuesday, November 13, 9:00am–9:45am
Room 301, David L. Lawrence Convention Center

Interface Actuations for Micro/Nano Fluidics
(IMECE2018-90101)

Sung Kwon Cho
University of Pittsburgh

Abstract: Due to dominant interfacial tensions emerging in micro/nano scale, controlling and actuating of interfaces are of critical importance in many micro/nano fluidic applications. On a quest to efficient interfacial actuations, Dr. Cho's group has been studying and developing many mechanisms and methods. In this talk, he will present two major topics on interface actuations and their applications: (1) microswimmer propelled by acoustically oscillating micro bubbles and (2) electrowetting and dielectrowetting for lab-on-a-chip applications. Micro propulsion is a key element in the micro-swimmer that can be potentially applied to navigate inside human and animal bodies. Recently, we have developed a micro propulsion method where acoustically excited oscillating bubbles generate streaming flows and propulsion forces. A variety of propelling motions have been achieved by carefully designing/fabricating devices and controlling exciting conditions. For the second topic, he will present a variety of droplet manipulations using dielectrowetting that highly localizes liquid dielectrophoresis to the three-phase contact line. In addition, he will also present how to mitigate bio-fouling (biomolecule adsorption), which is one of the critical hurdles against practical applications of droplet-based lab-on-a-chip systems. Detailed results and discussions on the above topics will be presented.



Bio: Sung Kwon Cho earned B.S., M.S., and Ph.D. from Mechanical Engineering at Seoul National University in 1990, 1992 and 1998, respectively. After postdoctoral experience at the University of California, Los Angeles (UCLA), he joined the faculty of the

Department of Mechanical Engineering and Materials Science at the University of Pittsburgh in Fall 2003 as an Assistant Professor and then was promoted to Associate Professor with tenure in 2009 and to Professor in 2018. Since Dr. Cho established the "Microfluidic Systems Lab" in 2003, my primary research focus is on "micro bubbles, micro drops, and micro interfaces as fluidic actuators," with an emphasis on the development of a variety of micro/bio fluidic transducers and integrated systems that enable us to efficiently handle a wide range of micro/bio substances. The nature of my research is highly interdisciplinary, encompassing fluid mechanics, micro/nano manufacturing, interfacial science, electrical engineering, and bioengineering. In essence, my research activities heavily rely on micro/nano fabrication or MEMS (microelectromechanical system) technology, leveraging development and usage of the micro/nano facilities at the University of Pittsburgh. Overall, Dr. Cho has published over 50 archival journal articles and book chapters in micro/bio fluidics and MEMS areas mostly with financial supports from

federal grants (NSF, DARPA, NIH, DOD, DOE, HSARPA, and AHA) and the University of Pittsburgh.

Track 10: Heat Transfer

10-64-1 HEAT TRANSFER AND THERMAL ENGINEERING PLENARY I

Tuesday, November 13, 8:00am–8:45am
Room 306, David L. Lawrence Convention Center

Multiscale Modeling of Nanoparticle Transport: Applications to Targeted Drug
(IMECE2018-90102)

Portnovo S. Ayyaswamy
University of Pennsylvania

Abstract: This talk will describe methods based on equilibrium and non-equilibrium statistical mechanics to construct numerical procedures that enable predictive models in cell biology and bioengineering. The models described here have particular relevance to targeted drug delivery employing nano-sized carriers. The nano particle shape considered here is either spherical or elliptical. Predictions from the simulations of the models are validated by comparison with experimental data where available.



Bio: Professor Portonovo S. Ayyaswamy is one of the most distinguished and internationally recognized researcher and educator today in the fields of Heat Transfer and Thermal Science & Engineering. He is recognized not only as an outstanding scholar

and educator but also as an immensely impactful contributor to major developments in industry. He has made many original and seminal contributions to the science and art of heat and mass transfer, particularly in multi-phase flows, phase-change heat and mass transfer, droplets and bubbles dynamics, ionized arc-plasma transport, bio heat and mass transfer, and nano-carrier thermal motion and transport. His very long list of distinguished achievements in heat transfer research, education, and professional and industry service are acknowledged internationally. Dr. Ayyaswamy, Asa Whitney Professor of Dynamical Engineering, University of Pennsylvania, received his Ph.D. (1971) from UCLA, M.E. (1967), and M.S. (1965) from Columbia University, and B.E. (1962) from University of Mysore. He has co-authored the highly regarded and extensively subscribed monograph: *Transport Phenomena with Drops and Bubbles* (Springer, 1997). He has also contributed a significant chapter, entitled "Introduction to Biofluid Mechanics," in the book, *Fluid Mechanics*, by P.K. Kundu and I.M. Cohen (Academic Press, MA, 2007). He has served as an expert on numerous NASA, NIH, NSF, NRC, and NAE. He is a Fellow of ASME and currently the Editor (2016–2021) of the ASME *Journal of Heat Transfer*. Dr. Ayyaswamy has been the recipient of the AIAA Aerospace Professional of the Year award (1997), ASME Heat Transfer Memorial Award – Science (2001), ASME Worcester Reed Warner Medal (2007), 75th Anniversary Medal (2013) of the ASME Heat Transfer Division, and the ASME-AICHe Max Jakob Memorial Award (2015), among others. At the University

of Pennsylvania, he has received the Reid Warren Award and the Lindback Award for Distinguished Teaching. In 2014, he was celebrated with a Festschrift on his 70th birthday (P. Ayyaswamy's 70th Birthday Tribute: Special Sessions on I – Interfacial Fluid Dynamics, and II – Devices and Modeling Nanoparticles) at the 7th World Congress of Biomechanics, Boston, MA. He was also elected (2014) to the governing board of the American Society for Gravitational and Space Research.

Track 10: Heat Transfer

10-64-2 HEAT TRANSFER AND THERMAL ENGINEERING PLENARY II

Tuesday, November 13, 9:00am–9:45am
Room 306, David L. Lawrence Convention Center

Aerospace Thermal Management: Challenges and Opportunities (IMECE2018-90103)

Andrew Bicos

Office of Congressman Tom Reed (NY-23)

Abstract: This talk is focused on providing an overview of thermal technology solutions for broader aerospace applications, which include hypersonic vehicle, commercial and military aircrafts, satellite and spacecraft systems, along with emerging areas of hybrid propulsion and more electric aircraft architecture. The anticipated thermal and power growth in aerospace systems in coming years is driving the need for ever efficient, reliable, and affordable heat dissipation, storage, and waste heat to power conversion technology, capable of managing thermal energy at the multi MW level. There is need for an interdisciplinary and multifunctional research and product development approach to meet 21st century space and aviation challenges. Recent advances in materials and advanced fabrication methods (including additive manufacturing) have opened up significant design improvement possibilities for development of “next generation” high performance, integrated thermal management solutions. Applications of this approach are illustrated by selective examples, such as structurally integrated thermal management for hypersonic vehicle, air/liquid cooling, and thermal energy storage devices for pulsed power systems and use of novel lightweight 3D printed materials in aircraft, satellite, and spacecraft systems. Finally, the need for synergetic collaboration among academia, industry, and government research organizations is emphasized for rapid development of economically viable, next generation thermal technologies for aerospace applications.



Bio: Dr. Bicos is on leave from The Boeing Company. His previous assignment was in Boeing Research & Technology, where he was director of the performance technology strategy, where his responsibilities included developing the enterprise strategy for all

flight sciences R&D at Boeing and managing the portfolio of activities that develop and transition technologies and processes into Boeing's wide array of products. He was also the chief engineer for the aeromechanics technology team,

where he ensured that the technologies transitioned to the products are technically sound and meet customer requirements. Prior to this assignment, he was the director for enterprise manufacturing technology strategy and before that for the structures and materials technology strategy. Dr. Bicos joined the company in 1987. His prior assignments include project leadership positions within the Boeing Satellite Systems engineering design and analysis directorate, Delta rocket program mission assurance, and two years in supply chain management. Prior to the Boeing and McDonnell Douglas merger in 1997, he was senior manager responsible for advanced structures R&D for the McDonnell Douglas Phantom Works organization in which he specialized in composites and adaptive/multifunctional structures technology. Dr. Bicos has published more than 20 technical papers and articles on innovative composites, adaptive structures, and vibration reduction technologies. He has two patents, one for composite damage detection and the other for a structural damping device. He has received a B.S. in engineering and a MBA from UCLA, as well as a M.S. and Ph.D. in aeronautics and astronautics from Stanford University. He has held positions on the AIAA Structural Dynamics and ASME Adaptive Structures and Material Systems technical committees and is a former chairman of the ASME Aerospace Division. He is an Associate Fellow of the AIAA and the immediate past chair of the ASME Industry Advisory Board.

Track 11: Materials Genetics to Structures

11-23-1 MATERIALS: GENETICS TO STRUCTURES PLENARY I

Tuesday, November 13, 8:00am–8:45am
Room 307, David L. Lawrence Convention Center

Biological Materials and Mechanics: Challenges and Opportunities (IMECE2018-90108)

Marc A. Meyers

UC San Diego

Abstract: Biological materials science is a new and vibrant field of materials science and engineering. Although biologists have been studying organisms for centuries, it is only recently that materials scientists have started to use their fantastic experimental, computational, and analytical arsenal of tools to reveal new features. This talk presents the Arzt eptahedron, which defines seven unique and defining characteristics of biological materials. The plethora of different structures and mechanical properties of biological materials is systematized through a new paradigm: eight structural design elements, which are motifs appearing on different species and scales, and which enable analytical treatment and lead to enhanced understanding. We have applied this approach to approximately twenty different organisms. We illustrate our approach by applying this knowledge to the toucan beak, rabbit and pig skin, fish scales, pangolin scales, and feathers. Current efforts at bioinspired materials and designs, including feathers, whale baleen, seahorse tail, and gar scales, are also discussed.



Bio: Marc A. Meyers is Distinguished Professor of Materials Science at the University of California, San Diego. His research field is the mechanical behavior of materials, focused on dynamic behavior of materials, nanocrystalline materials, and biological materials. In the dynamic behavior of materials, the unifying theme is the high rate at which events occur. He initiated this work in 1972 and has dedicated 43 years to unifying it by emphasizing the physical and chemical phenomena. This has been defined in his *Dynamic Behavior of Materials* (1994). His honors include Fellow, TMS, APS, and ASM, as well as awards in the U.S. (ASM Charles Barrett, Albert White, and Albert Sauveur Awards, TMS Mehl, Morris Cohen and Educator (Weertman) Awards, Acta Materialia Materials and Society Award, SMD/TMS Distinguished Engineer/Scientist and Service Awards, APS Shock Compression Science Award); Europe (Humboldt, DGM Heyn, and DYMAT Rinehart Awards); and China (Lee Hsung Award). He was co-founder of the Center for Explosives Technology Research, New Mexico Tech, and of the EXPLOMET conference series (1980–2000). He is also the co-author of *Mechanical Metallurgy*, *Mechanical Behavior of Materials*, and *Biological Materials Science*, and approximately 400 papers. He is corresponding member of the Brazilian Academy of Sciences and of the Institut Grand Ducal (Luxembourg). In 2014, he completed the kayak descent of the River of Doubt in honor of the 1914 Amazon expedition co-led by Theodore Roosevelt and the Brazilian explorer Col. Rondon. He also writes fiction and is the author of *Mayan Mars*, *Chechnya Jihad*, *D'amour et d'acier*, and *Yanomami*.

Track 11: Materials Genetics to Structures

11-23-2 MATERIALS: GENETICS TO STRUCTURES PLENARY II

Tuesday, November 13, 9:00am–9:45am
Room 307, David L. Lawrence Convention Center

The Future of Aerospace Materials: Challenges and Opportunities
 (IMECE2018-90109)

Richard A. Vaia
Air Force Research Laboratory

Abstract: Over a hundred years ago, the pioneers of aviation took flight in no small part due to material innovations ranging from novel casting of aluminum engine blocks to judicious selection of natural materials. Unquestionably, the future of aerospace will look as different from today as the Wright Flyer and Curtiss June Bug differ from UAVs and F35s. However, the role of materials will remain unchanged—they will be the crucial ingredient that enables these future machines to push the performance envelope. Using examples from current research within the Air Force Research Laboratory, the tools necessary to hasten the development of these vital materials will be discussed. These range from embracing technologies from the digital revolution to accelerate materials development, reduce qualification cost, and provide agile manufacturing methods, to harvesting the potential at the intersection of

nano-based metamaterials, smart surfaces, nanostructured devices, and biotechnology to enable autonomous systems that can execute complex tasks in evolving environments.



Bio: Richard A. Vaia is the Technical Director of the Functional Materials Division at the U.S. Air Force Research Laboratory (AFRL). The 200+ scientists and engineers he leads deliver materials and processing solutions to revolutionize AF capabilities in Survivability, Directed Energy, Reconnaissance, and Human Performance. Additionally, he has published more than 200 articles on nanomaterials, with honors including the AF McLucas Award for Basic Research, ACS Doolittle Award, Air Force Outstanding Scientist, Air Force Office of Scientific Research Star Teams, and Fellow of the Materials Research Society, American Physical Society, American Chemical Society, NextFlex, and the Air Force Research Laboratory.

Track 12: Mechanics of Solids, Structures and Fluids

12-40-1 MECHANICS OF SOLIDS, STRUCTURES AND FLUIDS PLENARY I

Tuesday, November 13, 8:00am–8:45am
Room 308, David L. Lawrence Convention Center

The Isogeometric Approach to Analysis
 (IMECE2018-90104)

Thomas J.R. Hughes, Jr
UT Austin

Abstract: The vision of Isogeometric Analysis was first presented in a paper published October 1, 2005. Since then it has become a focus of research within both the fields of finite element analysis (FEA) and computer aided design (CAD) and is rapidly becoming a mainstream analysis methodology and a new paradigm for geometric design. The key concept utilized in the technical approach is the development of a new foundation for FEA, based on rich geometric descriptions originating in CAD, resulting in a single geometric model that serves as a basis for both design and analysis. In this overview, the talk will describe some areas in which progress has been made in developing improved methodologies to efficiently solve problems that have been at the very least difficult, if not impossible, within traditional FEA. It will also describe current areas of intense activity and areas where problems remain open, representing both challenges and opportunities for future research.



Bio: Thomas J.R. Hughes holds a B.E. and M.E. in Mechanical Engineering from Pratt Institute and M.S. in Mathematics and Ph.D. in Engineering Science from the University of California at Berkeley. He taught at Berkeley, Caltech, and Stanford before joining the

University of Texas at Austin. At Stanford, he served as Chairman of the Division of Applied Mechanics, Chairman of the Department of Mechanical Engineering, and Chairman of the Division of Mechanics and Computation, and occupied the Cray Chair of Engineering. At Austin, he is Professor of

Aerospace Engineering and Engineering Mechanics and holds the Computational and Applied Mathematics Chair III. He is a Fellow of the American Academy of Mechanics, ASME, AIAA, ASCE, AAAS; Founder, Fellow, and past President of USACM and IACM; past Chairman of the Applied Mechanics Division of ASME; past Chairman of the US National Committee on Theoretical and Applied Mechanics; and co-editor of the international journal *Computer Methods in Applied Mechanics and Engineering*. Dr. Hughes is one of the most widely cited authors in Engineering Science. He has received the Huber Prize and Von Karman Medal from ASCE; the Timoshenko, Worcester Reed Warner, and Melville Medals from ASME; the Von Neumann Medal from USACM; the Gauss-Newton Medal from IACM; and many other national and international awards. He is a member of the U.S. National Academy of Sciences; the U.S. National Academy of Engineering; the American Academy of Arts and Sciences; the Academy of Medicine, Engineering and Science of Texas; and a Foreign Member of the Royal Society of London, the Austrian Academy of Sciences, and the Istituto Lombardo Accademia di Scienze e Lettere. Dr. Hughes has received honorary doctorates from the universities of Louvain, Pavia, Padua, Trondheim, Northwestern, and A Coruña.

Track 12: Mechanics of Solids, Structures and Fluids

12-40-2 MECHANICS OF SOLIDS, STRUCTURES AND FLUIDS PLENARY II

Tuesday, November 13, 9:00am–9:45am
Room 308, David L. Lawrence Convention Center

How to Design Quasibrittle and Lamellar Biomimetic Structures for Failure Probability <10⁻⁶: Gauss-Weibull and Fishnet Statistics
 (IMECE2018-90105)

Zdenek P. Bazant
Northwestern University

Abstract: Similar to nacre (or mother-of-pearl), imbricated lamellar structures are widely found in natural and man-made materials, and are of interest for biomimetics. These staggered imbricated structures are known to be rather insensitive to defects and have strength and fracture toughness an order-of-magnitude higher than their constituents. Their deterministic behavior has been intensely studied, while statistical studies have been rare and no theoretical basis for the probability density function (pdf) of strength has yet been formulated. This paper presents a theoretical and numerical study of the pdf of strength and of the corresponding statistical size effect. After reasonable simplifications of the shear bonds, a lamellar axially loaded lamellar shell is statistically modelled as a fishnet pulled diagonally. A FE model is developed and used in many millions of Monte Carlo simulations of strength. An analytical model for failure probability of the fishnet is developed and matched to the computed statistical histograms of strength of fishnet structures of various sizes. Based on fresh results at Northwestern, post-peak progressive softening of fishnet links is considered and its effect on the strength probability distribution is analyzed on the basis of order statistics. It

appears that, with increasing size, the pdf of strength slowly transits from Gaussian to Weibull distribution but the transition is different from that previously obtained at Northwestern for quasibrittle materials of random heterogeneous mesostructure. An important practical implication is that the staggered lamellar architecture not only enhances the mean strength but also contributes an additional major strength increase at the failure probability level of 10⁻⁶, which is what matters for structural safety.



Bio: Born and educated in Prague (Ph.D. 1963), Zdenek P. Bazant joined Northwestern in 1969, where he has been W.P. Murphy Professor since 1990 and, simultaneously, McCormick Institute Professor since 2002, and Director of Center for Geomaterials (1981–1987). He was inducted to NAS, NAE, American Academy of Arts and Sciences, and Royal Society of London; to the academies of Italy, Austria, Spain, Czech Republic, Greece and Lombardy, and Academia Europaea. He is an honorary Member of ASCE, ASME, ACI, and RILEM. He received the Austrian Cross of Honor for Science and Art I. Class; seven honorary doctorates (Prague, Karlsruhe, Colorado, Milan, Lyon, Vienna, Ohio State); ASME Medal, ASME Timoshenko, Nadai and Warner Medals; ASCE von Karman, Newmark, Biot, Mindlin and Croes Medals, and Lifetime Achievement Award; SES Prager Medal; RILEM L'Hermite Medal; Exner Medal (Austria); Torroja Medal (Madrid); Solin and Bazant, Sr. Medals (Prague); etc. He authored six books: *Scaling of Structural Strength*, *Inelastic Analysis, Fracture and Size Effect*, *Stability of Structures*, *Concrete at High Temperatures*, and *Concrete Creep*. H-index: 115, citations: 58,000 (on Google, June 2017, incl. self-cit.), i10 index: 566. In 2015, ASCE established the ZP Bazant Medal for Failure and Damage Prevention. He is one of the original top 100 ISI Highly Cited Scientists in Engineering. (www.ISIhighlycited.com).

Track 13: Micro- and Nano-Systems Engineering and Packaging

13-2-1 MICRO- AND NANO-SYSTEMS ENGINEERING AND PACKAGING PLENARY I

Wednesday, November 14, 9:00am–9:45am
Room 301, David L. Lawrence Convention Center

The Role of Arrayed Sensor Systems-on-Chip in Next-Generation MEMS Inertial Sensing
 (IMECE2018-90106)

Gary K. Fedder
Carnegie Mellon University

Abstract: Two recent projects illustrate the continued push for technological innovation to improve inertial sensor performance, generally measured by higher dynamic range, lower bias instability, and lower power. Bias drift compensation by observing on-chip “auxiliary” sensors is viable when extrinsic factors, such as ambient temperature and packaging stress fluctuations, cause the drift. As one example, die stress compensation, which augments temperature compensation,

resulted in a significant reduction in long-term drift in our silicon-on-insulator mode-symmetric vibratory-rate gyroscope. In the second example, pushing the state-of-the-art in dynamic range in a CMOS-MEMS high-g shock sensor presents challenges met by maturation of a system-on-chip design comprising an array of hundreds of individual accelerometer cells and augmented by piezoFET die-level stress sensors.



Bio: Gary K. Fedder is the Howard M. Wilkoff Professor of Electrical and Computer Engineering, Professor of The Robotics Institute, and Vice Provost for Research at Carnegie Mellon University. He previously served in administrative roles at Carnegie

Mellon as Director of the Institute for Complex Engineered Systems (2006–2014) and Associate Dean for Research in the College of Engineering (2013–2015). From 2011 to 2012, Dr. Fedder served as a technical co-lead in the U.S. Advanced Manufacturing Partnership where he worked with industry, academia, and government to generate recommendations that motivated the launch of the National Network for Manufacturing Innovation, now called Manufacturing USA. He was founding president and later served as interim CEO of the Advanced Robotics for Manufacturing Institute in 2017. Dr. Fedder received his B.S. and M.S. in EECS from MIT in 1982 and 1984, respectively, and his Ph.D. in EECS from the University of California at Berkeley in 1994. He worked at Hewlett-Packard as an R&D engineer from 1984 to 1989. His personal research lies in design and process integration of MEMS where he has contributed to over 280 research publications and holds 15 patents. He is an IEEE Fellow for contributions to integrated MEMS. He served as subject editor for the IEEE *Journal of Microelectromechanical Systems* from 2002 to 2013 and currently serves on the executive editorial board for the IoP *Journal of Micromechanics and Microengineering*, as a member of the editorial board for the IET *Micro & Nano Letters*, and as co-editor of the Wiley-VCH Advanced Micro- and Nanosystems book series.

Track 13: Micro- and Nano-Systems Engineering and Packaging

13-2-2 MICRO- AND NANO-SYSTEMS ENGINEERING AND PACKAGING PLENARY II

**Thursday, November 15, 8:00am–8:45am
Room 303, David L. Lawrence Convention Center**

2D Materials, Flexible Electrodes and Surfaces (IMECE2018-90107)

Eui-Hyeok Yang

Stevens Institute of Technology, USA

Abstract: There has been a growing interest in two dimensional (2D) crystals beyond graphene, exhibiting novel properties and potential applications in next generation electronic and photonic devices. Graphene has superior properties, including high carrier mobility, ultrahigh surface area and excellent thermal conductivity. Whereas the lack of a band gap is a critical limitation for the use of graphene in electronic devices, monolayer semiconducting transition metal dichalcogenides

(TMDs) have shown highly promising prospects in electronics and optoelectronics. Therefore, non-graphene 2D atomic layers, such as hexagonal boron nitride (hBN) and TMDs, have been integrated into research scale devices, thereby probing mechanical, chemical, electrical and optoelectrical functions. I will present our investigation of chemical vapour deposition (CVD)-growth, achieving localized, patterned, single crystalline or polycrystalline monolayers of TMDs, including MoS₂, WS₂, WSe₂ and MoSe₂, as well as their heterostructures. We particularly focus on enabling the fabrication of epitaxially grown TMDs on other van der Waals materials towards synthesizing TMDs with an ultralow-defect density. We perform microscopic and macroscopic material characterization to provide predictive strategies for TMD growth and in turn, illuminate the role of dissimilar 2D substrates in the prevention of interior defects in TMDs. We furthermore demonstrate the growth of TMD homobilayers with well-ordered stacking angles by controlling edge structures of the underlying TMD layer. Other related projects include modelling to prevent the anomalies encountered in topographic images of TMD monolayers in dynamic atomic force microscopy, and elucidating the effect of TMD surfaces and their geometric arrangements on cellular morphology and adhesion. We also investigate other nanomaterials, including vertically aligned carbon nanotubes for stretchable supercapacitors. Building on these results, our next step is to combine 2D materials with flexible substrates toward next generation wearable devices. Currently my group is collaborating with many top research groups in the US and around the world.



Biography: Eui-Hyeok Yang is a full professor in the Mechanical Engineering Department at Stevens Institute of Technology. He received his Ph.D. from Ajou University, Korea. After his postdoctoral training at University of Tokyo and at California Institute of Technology, he

joined NASA's Jet Propulsion Laboratory (JPL), where he became a Senior Member of the Engineering Staff. In recognition of his excellence in advancing the use of MEMS-based actuators for NASA's space applications, he received the prestigious Lew Allen Award for Excellence at JPL in 2003. He joined Stevens Institute of Technology as an Associate Professor in the Department of Mechanical Engineering in 2006, established the Multi-User Micro Device Laboratory at Stevens in 2008, and became a tenured full Professor in Mechanical Engineering in 2014. Currently, his group's research covers the growth and nanofabrication of graphene, carbon nanotubes and TMD heterostructures, as well as the implementation of tunable wetting and surface interaction. He has received more than 35 major grants over the course of his career from several federal agencies, including six NSF and three AFOSR grants, and five NASA and three NRO contracts. Dr. Yang's service to the professional community includes formal appointments, such as Editorial Board Member of Nature's *Scientific Reports*, Associate Editor of *IEEE Sensors Journal*, and Editorial Board Member of the Elsevier journal, *Nano-Structures & Nano-Objects*. Dr. Yang has published hundreds of articles, books, and papers, as well as provided keynotes, presentations, and seminars at various academic and industrial events.



Technical Program

EXHIBIT HALL POSTER SESSIONS		
Undergraduate Research and Design Expo Student Poster Competition	Sunday, November 11	5:30pm–7:00pm
NSF Student Competition	Wednesday, November 14	11:45am–2:30pm
Virtual Podium	Wednesday, November 14	11:45am–2:30pm

MONDAY, NOVEMBER 12

Room	9:45am–11:30am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
301	1-1-1: Nonlinear Phononics	1	1-1-2: Micro and Nano Phononics	2	1-1-3: Design of Phononic Crystals and Metamaterials	3
302	1-2-1: General Noise and Vibration Control	1	1-3-1: Computational Acoustics	2	1-6-1: Flow-Induced Acoustics and Human Perception of Noise	3
303	5-1-1: Product and Process Design I	55	5-1-2: Product and Process Design II	57	5-1-3: Product and Process Design III	59
304	5-5-1: Product Optimization I	55	5-5-2: Product Optimization II	57	5-8-1: Reliability and Risk in Energy Systems	59
305	5-11-1: Failure and Forensic Analysis	55	5-12-1: Reliability Methods	58	5-13-1: Safety, Risk and Reliability of Emerging Technologies	60
306	8-5-1: Energy Systems Components – 1	89	8-2-1: Energy and Exergy Analysis of Power Cycles	91	8-5-2: Energy Systems Components – 2	94
307	6-4-1: Robot Control I	65	6-4-2: Robot Control II	68	6-4-3: Robot Design I	70
308	6-4-7: Compliant Mechanisms	65	6-2-1: Dynamics, Vibration, and Control – I	67	6-2-2: Dynamics, Vibration, and Control – II	69
309	6-13-1: Control Theory and Applications I	66	6-8-1: Mechanics of Smart Structures	68	6-8-2: Energy Harvesting and Transducers	70
310	6-17-1: Multi-Physics Dynamics-Control & Diagnostics-Prognostics of Structures I	67	6-9-1: Novel Control of Dynamic System I	68	6-9-2: Novel Control of Dynamic System II	71
311	6-15-1: Measurement and Analysis Techniques in Nonlinear Dynamics I	66	6-19-1: Renewable Energy, Structural Health Monitoring, and Distributed Structural Systems I	69	6-11-2: Vibrations of Continuous Systems II	71
315	6-12-1: Mobile Service Robots and Unmanned Vehicles I	65	6-12-2: Mobile Service Robots and Unmanned Vehicles II	69	8-2-2: Thermodynamics of Cooling and Thermal Processes	94
316	8-15-1: CMS-Biofuel Systems and Processes	90	8-16-1: CMS-Biofuels Production, Conversion, and Simulation	93	8-1-1: Energy-Related Multidisciplinary – 1	93
317	8-4-1: Advanced Power Cycles	89	8-4-2: Improvement in Performance and Emissions of Energy Systems	91	8-4-3: Solar/Waste-Heat Power Generation	94
318	8-11-1: Lithium Ion Batteries – Design and Performance	90	8-11-2: Modeling Efforts in Batteries	92	8-11-3: Structural Analysis of Li-Ion Batteries	95
319	8-6-1: Low-Temperature Energy Conversion Systems	89	8-10-1: Advanced Technologies for Wind Energy	92	8-10-2: Advanced Technologies for Solar Energy	95
323	10-3-1: K6-2 Numerical Analysis and Performance Assessment of Energy Systems	123	10-4-1: System Analysis	126	10-32-1: CMS - Combustion Power System	129
324	10-60-1: Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – I	125	10-60-2: Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – II	128	10-60-3: Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – III	130
325	10-21-1: K9-1 Thermal Transport Across Hard/Soft Interfaces – I	123	10-21-2: K9-1 Thermal Transport Across Hard/Soft Interfaces – II	126	10-6-1: Batteries	128
326	10-59-1: Heat and Mass Transport Photogallery	124	10-20-1: Panel on Fundamentals of Non-Equilibrium Transport	126	10-22-1: K9-2 Coupled Thermal Transport by Electrons, Magnons, and Phonons	129
327	10-4-2: Component/Material Design and Analysis	123	10-40-1: K15-1 Transport Phenomena in Manufacturing and Materials Processing – I	127	10-8-1: Heat Transfer in Passive Thermal Control Systems	129
321	11-2-1: Nanomaterials for Energy I	157	11-2-2: Nanomaterials for Energy II	159	11-15-1: Multifunctional Nanomaterials 1	161
320	11-7-1: Fracture and Damage: Nano- to Macro-Scale I	157	11-7-2: Fracture and Damage: Nano- to Macro-Scale II	159	11-9-1: Materials Processing and Characterization I	161
330	11-8-1: Material Processing of Flexible Electronics, Sensors, and Devices I	158	11-8-2: Material Processing of Flexible Electronics, Sensors, and Devices II	159	11-8-3: Material Processing of Flexible Electronics, Sensors, and Devices III	161

MONDAY, NOVEMBER 12

Room	9:45am–11:30am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
331	12-15-1: Inaugural Symposium on the Constitutive Modeling of the Mechanical Behavior and Performance of Electronic, Photonic, MEMS, and NEMS Materials, Assemblies, Packages, Modules, and Systems	174	12-33-1: Congress-Wide Symposium on NDE & SHM – Nondestructive Characterization of Solids, Structures and Fluids	178	12-35-1: Congress-Wide Symposium on NDE & SHM – Active and Passive Health Monitoring of Structures	182
333	12-1-1: Mechanics of Soft Materials: Structure	173	12-1-2: Mechanics of Soft Materials: Gels/Active Materials 1	176	12-1-3: Mechanics of Soft Materials: Gels/Active Materials 2	179
334	12-28-1: Instabilities in Solids and Structures: Mechanics of Slender Solids	175	12-28-2: Instabilities in Solids and Structures: Numerical/Analytical Stability	177	12-28-3: Instabilities in Solids and Structures: Active and Soft Materials	181
335	12-10-1: Modeling and Experiments in Nanomechanics and Nanomaterials 1	173	12-10-2: Modeling and Experiments in Nanomechanics and Nanomaterials 2	176	12-10-3: Modeling and Experiments in Nanomechanics and Nanomaterials 3	179
336	12-18-1: Computational Modeling of Extreme Events	174	12-18-2: Computational Modeling of Extreme Events	177	12-13-1: Recent Advances and Applications in Meshfree and Particle Methods	180
338	12-19-1: Computational Fluid-Structure Interaction	175	12-19-2: Computational Fluid-Structure Interaction	177	12-19-3: Computational Fluid-Structure Interaction	180
401	12-22-1: Deformation and Failure of Multifunctional Materials	175	12-38-1: Young Medalist Symposium	179	12-38-2: Young Medalist Symposium	182
402	12-6-1: In-Situ Techniques in Experimental Mechanics	173	12-36-1: Keynote Lectures on Computational Mechanics – 1	178	12-36-2: Keynote Lectures on Computational Mechanics – 2	182
403	1-8-1: Vibration and Acoustic Measurements, Signal Processing, and Test Facilities I	1	1-8-2: Vibration and Acoustic Measurements, Signal Processing, and Test Facilities II	3	1-8-3: Vibration and Acoustic Measurements, Signal Processing, and Test Facilities III	4
404	10-51-1: Thermal Management of Electronic Equipment	124	10-54-1: Methods in Computational Heat Transfer	127	10-42-1: K16-1: Heat Transfer in Electronic Equipment – I	130
405	5-17-1: Structural Systems Crashworthiness	56	5-17-2: Full Vehicle Crashworthiness and Occupants Protection	58	12-22-2: Deformation and Failure of Multifunctional Materials	181
406	5-14-1: Testing for Product Reliability and Safety	56	5-16-1: Safety in Transportation, Agriculture, and Off-Road Vehicles	58	5-16-2: Safety in Transportation, Agriculture, and Off-Road Vehicles	60
407	11-11-1: Modeling, Simulation and Design of Multifunctional Materials 1	158	11-11-2: Modeling, Simulation and Design of Multifunctional Materials 2	160	11-4-1: Materials and 3D Printing for Biology and Medicine	160

TUESDAY, NOVEMBER 13

Room	8:00am–9:45am	PG.	10:00am–11:45am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
301	9-17-1: Fluids Engineering Plenary I 9-17-2: Fluids Engineering Plenary II	109 109	1-12-1: NDE & SHM: Ultrasonic Waves for Material Characterization and Damage Assessment	6	1-1-5: Topological Phononics II	6	1-1-7: Control of Phononic Crystals and Metamaterials	7
302	8-17-1: Energy Plenary	96	1-1-4: Topological Phononics I	5	1-1-6: Theory, Computation, and Experiments in Phononics	6	5-18-1: General	64
303	6-1-1: Dynamics, Vibration, and Control Plenary	72	5-1-4: Product and Process Design IV	61	5-2-1: Social Context Aware Design	62	5-18-2: General	64
304	5-19-1: Design, Reliability, Safety, and Risk Plenary	61	5-4-1: CAD, CAM and CAE Design I	61	5-4-2: CAD, CAM and CAE Design II	63	11-8-5: Material Processing of Flexible Electronics, Sensors, and Devices V	166
305	1-13-1: Acoustics, Vibration, and Phononics Plenary	5	5-10-1: Topics on Safety and Hazard Analysis	62	5-10-2: Topics on Risk and Hazard Analysis	63	6-20-1: Dynamics, Vibration, and Control for Structural Health Monitoring Applications I	79
306	10-64-1: Heat Transfer and Thermal Engineering Plenary I 10-64-2: Heat Transfer and Thermal Engineering Plenary II	131 131	6-10-1: Multibody Dynamic Systems and Applications I	74	6-10-2: Multibody Dynamic Systems and Applications II	76	6-10-3: Multibody Dynamic Systems and Applications III	78
307	11-23-1: Materials: Genetics to Structures Plenary I 11-23-2: Materials: Genetics to Structures Plenary II	162 162	6-4-4: Robot Design II	72	6-4-5: Mechanism Design I	74	6-4-6: Mechanism Design II	77

TUESDAY, NOVEMBER 13

Room	8:00am–9:45am	PG.	10:00am–11:45am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
308	12-40-1: Mechanics of Solids, Structures and Fluids Plenary I 12-40-2: Mechanics of Solids, Structures and Fluids Plenary II	183 183	6-6-1: Vibration, Noise Control and Damping Technologies I	73	6-6-2: Vibration, Noise Control and Damping Technologies II	75	6-6-3: Vibration, Noise Control and Damping Technologies III	77
309			6-7-1: Dynamics and Control in Micro/Nano Engineering I	73	6-3-1: Nonlinear Dynamics, Control, and Stochastic Mechanics I	74	6-3-2: Nonlinear Dynamics, Control, and Stochastic Mechanics II	76
310			6-5-1: Fluid-Structure Interaction I	72	6-5-2: Fluid-Structure Interaction II	75	6-11-1: Vibrations of Continuous Systems I	78
311			8-2-3: Chemical Thermodynamic Processes	96	8-2-4: On Entropy and Irreversibilities' Minimization	98	8-8-1: Environmental Aspects of Energy Systems	101
315			8-1-2: Energy-Related Multidisciplinary – 2	96	8-14-1: Nuclear Power Plants: Design, Analysis, and Safety	99	8-7-1: Thermal Energy Storage – Devices I	101
316			8-4-4: Engines Behaviour and Fuel Characteristics	97	8-4-5: Design and Analysis of Energy Systems – 1	98	8-4-6: Design and Analysis of Energy Systems – 2	100
317			8-11-4: Thermal Aspects of Li-Ion Batteries	97	8-11-5: Beyond Li-Ion Batteries	99	8-3-1: Thermoeconomics	100
318			8-10-3: Advanced Technologies for Ocean Energy	97	8-10-4: Advanced Technologies for Wind Energy II	99	8-10-5: Advanced Technologies for Solar Energy II	102
319			9-3-1: Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – I	109	9-3-2: Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – II	111	9-3-3: Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – III	112
320			10-15-1: Fundamentals of Boiling and Evaporation	132	10-15-2: K8-1 Fundamentals of Boiling	134	10-15-3: K8-1 Fundamentals of Boiling, Evaporation, and Condensation	137
321			10-7-1: Analysis of Radiative Transfer in Energy Systems	131	10-7-2: Radiative Properties	134	10-10-1: K6-9 Two Phase Transport in Energy Systems and Non-Equilibrium and Dynamic Energy Systems	137
323			9-5-1: CFD Applications for Flow Optimization and Control – I	109	9-5-2: CFD Applications for Flow Optimization and Control – II	111	9-5-3: CFD Applications for Flow Optimization and Control – III	113
324			9-9-1: Mathematical Modeling in Microfluidics	110	9-9-2: Droplet Microfluidics	112	9-9-3: Fundamentals and Applications of Microfluidics	113
325			9-18-1: Young Engineers Paper (YEP) Contest	110	9-11-1: Computational Modeling of Multiphase Flows	112	9-11-2: Experimental Characterization of Complex Multiphase Flows	114
326			10-33-1: CMS – Sprays and Emissions	133	10-34-1: CMS – Applied Combustion: Modeling Heat Transfer and Combustion	135	10-34-2: CMS – Applied Combustion: Improving System Performance	138
327			10-42-2: K16-1: Heat Transfer in Electronic Equipment – II	133	10-53-1: Applications of Computational Heat Transfer: Convection	136	10-53-2: Applications of Computational Heat Transfer: Industrial Applications	139
330			10-23-1: K9-3 Phononic Crystals and Thermoelectrics – I	132	10-23-2: K9-3 Phononic Crystals and Thermoelectrics – II	135	10-25-1: K9-5 Micro-/Nanoscale Phase Change Heat Transfer – I	138
331			11-9-2: Materials Processing and Characterization II	163	11-9-3: Materials Processing and Characterization III	164	11-9-4: Materials Processing and Characterization IV	166
333			11-8-4: Material Processing of Flexible Electronics, Sensors, and Devices IV	162	11-10-1: Bioinspired Composites and Structures	164	11-10-2: Bioinspired Materials, Structures and Applications	166
334			11-12-1: Mechanics in Manufacturing of Multifunctional Materials and Structures I	163	11-12-2: Mechanics in Manufacturing of Multifunctional Materials and Structures II	165	11-14-1: Multifunctional Composite Materials and Structures 1	167

TUESDAY, NOVEMBER 7

Room	8:00am–9:45am	PG.	10:00am–11:45am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
335			12-10-4: Modeling and Experiments in Nanomechanics and Nanomaterials 4	184	12-17-1: Failure and Fracture of Additively Manufactured Materials and Structures – 1	187	12-17-2: Failure and Fracture of Additively Manufactured Materials and Structures – 2	190
336			12-1-4: Mechanics of Soft Materials: Constitutive Modeling	183	12-1-5: Mechanics of Soft Materials: Bioinspiration and Biomimetics	186	12-1-6: Mechanics of Soft Materials: Electro/Magneto/Chemo-Mechanics	188
338			12-28-4: Instabilities in Solids and Structures: Stability of Composites, Foams/Open-Cell Materials	185	12-28-5: Instabilities in Solids and Structures: Phase Transformations/Transitions and Multi-stability	187	12-13-2: Recent Advances and Applications in Meshfree and Particle Methods	190
401			12-8-1: Multi-Scale Computations in Fluids, Structures, and Materials 1	183	12-8-2: Multi-Scale Computations in Fluids, Structures, and Materials 2	186	12-8-3: Multi-Scale Computations in Fluids, Structures, and Materials 3	189
402			12-19-4: Computational Fluid-Structure Interaction	184	12-31-1: Design of Mechanical Metamaterials	187	12-31-2: Functionality of Mechanical Metamaterials	191
403			12-39-1: Drucker Medal Symposium	185	12-39-2: Drucker Medal Symposium	188	12-39-3: Drucker Medal Symposium	191
404			12-12-1: Mechanics of Thin-Film and Multi-Layer Structures	184	12-12-2: Mechanics of Thin-Film and Multi-Layer Structures	186	12-12-3: Mechanics of Thin-Film and Multi-Layer Structures	189
405			1-4-1: Structural-Acoustic System Identification	5	1-11-1: NDE & SHM: Acoustic and Vibration Methods in Structural Health Monitoring and Nondestructive Testing	7	10-39-1: Gas Turbine Heat Transfer and Cooling	139
406			10-36-1: K13-1 Heat Transfer in Multiphase Systems – I	133	10-36-2: K13-1 Heat Transfer in Multiphase Systems – II	136	10-40-2: K15-1 Transport Phenomena in Manufacturing and Materials Processing – II	139
407			10-6-2: Capacitors	137	11-14-4: Multifunctional Composite Materials and Structures 4	164	11-15-2: Multifunctional Nanomaterials 2	165

WEDNESDAY, NOVEMBER 14

Room	9:00am–9:45am	PG.	10:00am–11:45am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
301	13-2-1: Micro- and Nano-Systems Engineering and Packaging Plenary I	213	2-2-1: Congress-Wide Symposium on Additive Manufacturing: Metals-Directed Energy Deposition I	9	2-2-2: Congress-Wide Symposium on Additive Manufacturing: Metals-Directed Energy Deposition II	12	2-2-3: Congress-Wide Symposium on Additive Manufacturing: Metals – Powder Bed Fusion I	14
302	7-13-1: Engineering Education Plenary	81	2-13-1: Congress-Wide Symposium on Additive Manufacturing: Robotic Additive Manufacturing	10	2-13-2: Manipulators and Interfaces	13	2-13-3: Algorithms and Optimization	15
303	4-1-1: Biomedical and Biotechnology Plenary I	39	2-15-1: Digital Manufacturing in Cyber-Manufacturing Aspects	11	2-15-2: Digital Manufacturing in Digital Twin Aspects	13	2-15-3: Digital Manufacturing in Industry 4.0 Aspects	16
304	3-20-1: Advances in Aerospace Technology Plenary I	29	2-5-1: Mechanics and Physics of 2D Materials	9	2-5-2: Sensors and Electronics of 2D Materials	12	2-5-3: Synthesis and Processing of 2D Materials	14
305	2-1-1: Advanced Manufacturing Plenary	9	2-6-1: Advanced Surface Modification Using Machining	10	2-6-2: Conventional Machining	12	2-14-2: Laser-Matter Interaction and Its Applications in Materials Processing	15
306			2-14-1: Surface Modification Based on Laser Peening and Ablation	11	3-12-1: Peridynamics Modeling – 1	30	3-7-1: Dynamic Behavior of Composites	32

WEDNESDAY, NOVEMBER 14								
Room	9:00am–9:45am	PG.	10:00am–11:45am	PG.	1:45pm–3:30pm	PG.	3:45pm–5:30pm	PG.
307			3-18-1: Congress-Wide Symposium on NDE & SHM: Structural Health Monitoring of Aerospace Vehicles	29	3-19-1: Congress-Wide Symposium on NDE & SHM: Nondestructive Evaluation and Structural Health Monitoring of Composite Materials and Structures	31	3-2-1: Advances in Aerodynamics	31
308			3-1-1: General Aerospace	29	3-4-1: Advances in Aerospace Structures and Materials – 1	30	4-4-1: Tissue Characterisations	42
309			4-2-4: Damage Biomechanics IV: Cavitation as a Mechanism for Brain Injury	39	4-3-1: Vibration Characteristics and Characterisations	40	4-3-2: Vibration Applications to Therapy and Rehabilitation	42
310			4-8-1: Dynamics and Control of Biomechanical Systems I	39	4-8-2: Dynamics and Control of Biomechanical Systems II	41	4-8-3: Dynamics and Control of Biomechanical Systems III	43
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- 1-1-2: Micro and Nano Phononics**
- 1-1-3: Design of Phononic Crystals and Metamaterials**
- 1-1-4: Topological Phononics I**
- 1-1-5: Topological Phononics II**
- 1-1-6: Theory, Computation, and Experiments in Phononics**
- 1-1-7: Control of Phononic Crystals and Metamaterials**
- 1-11-1: NDE & SHM: Acoustic and Vibration Methods in Structural Health Monitoring and Nondestructive Testing**
- 1-12-1: NDE & SHM: Ultrasonic Waves for Material Characterization and Damage Assessment**
- 1-13-1: Acoustics, Vibration, and Phononics Plenary**
- 1-2-1: General Noise and Vibration Control**
- 1-3-1: Computational Acoustics**
- 1-4-1: Structural-Acoustic System Identification**
- 1-6-1: Flow-Induced Acoustics and Human Perception of Noise**
- 1-8-1: Vibration and Acoustic Measurements, Signal Processing, and Test Facilities I**
- 1-8-2: Vibration and Acoustic Measurements, Signal Processing, and Test Facilities II**
- 1-8-3: Vibration and Acoustic Measurements, Signal Processing, and Test Facilities III**

ACKNOWLEDGMENT

Track Organizers

Weidong Zhu, *University of Maryland, United States*
Mostafa Nough, *University at Buffalo, United States*
Shung H. Sung, *SHS Consulting, LLC, United States*

Topic Organizers

Mahmoud Hussein, *University of Colorado Boulder, United States*
Liang-Wu Cai, *Kansas State University, United States*
Albert Kirwan, *Electric Boat, United States*
Yousof Azizi, *Bridgestone Americas, United States*
Miao Yu, *University of Maryland, United States*

Weidong Zhu, *University of Maryland, Baltimore County, United States*
Yongfeng Xu, *University of Cincinnati, United States*
Robert Tomko, *Naval Nuclear Laboratory, United States*
Kristin Cody, *Naval Nuclear Laboratory, United States*
Haijun Liu, *Temple University, United States*
Andrei Zagrai, *New Mexico Institute of Mining & Technology, United States*
Shiv Joshi, *NextGen Aeronautics, United States*

Session Organizers

Mahmoud Hussein, *University of Colorado Boulder, United States*
Ankit Srivastava, *Illinois Institute of Technology, United States*

Nicholas Boechler, *University of Washington, United States*
Jinkyu Yang, *University of Washington, United States*
Kathryn Matlack, *University of Illinois Urbana-Champaign, United States*
Brent Paul, *Alion Science and Technology, United States*
Yongfeng Xu, *University of Cincinnati, United States*
Zhongquan Charlie Zheng, *University of Kansas, United States*
Firooz Bakhtiari-Nejad, *Amirkabir University of Technology, United States*

TRACK 1 ACOUSTICS, VIBRATION, AND PHONONICS

MONDAY, NOVEMBER 12

1-1 PHONONIC CRYSTALS AND METAMATERIALS

1-1-1 Nonlinear Phononics

Third Floor, David L. Lawrence Convention Center, Room 301
9:45am–11:30am

Session Chair: Mahmoud Hussein, *University of Colorado Boulder, Boulder, CO, United States*

Session Co-Chair: Liang-Wu Cai, *Kansas State University, Manhattan, KS, United States*

9:45am – Nonlinear Wave Propagation in Reconfigurable 2D Multistable Lattices With Bistable Springs

Technical Presentation. IMECE2018-89741

Julien Meaud, *Georgia Institute of Technology, Atlanta, GA, United States*

10:06am – Switchable Phononics via Instabilities in Soft Composites

Technical Presentation. IMECE2018-88467

Stephan Rudykh, *Technion - Israel Institute of Technology, Haifa, Israel*

10:27am – Inter-Modal Energy Tunneling With Subwavelength Characteristics in Nonlinear Waveguides

Technical Presentation. IMECE2018-87877

Weijian Jiao, **Stefano Gonella**, *University of Minnesota, Minneapolis, MN, United States*

10:48am – Conversion of Compressive Impact to Tensile Stress Waves via Origami-Based Mechanical Metamaterials

Technical Presentation. IMECE2018-87767

Hiromi Yasuda, **Yasuhiro Miyazawa**, **Jinkyu Yang**, *University of Washington, Seattle, WA, United States*

1-2 GENERAL NOISE AND VIBRATION CONTROL

1-2-1 General Noise and Vibration Control

Third Floor, David L. Lawrence Convention Center, Room 302
9:45am–11:30am

Session Chair: Albert Kirwan, *Electric Boat, Groton, CT, United States*

Session Co-Chair: Brent Paul, *Alion Science and Technology, Harrisburg, PA, United States*

9:45am – Numerical Investigation on Effects of Structure Parameters on Acceleration Noise of Involute Spur Gear System Under Different Operation Conditions

Technical Paper Publication. IMECE2018-86955

Changyin Wei, **Jingang Wang**, **Hai Liu**, **Yong Chen**, *Hebei University of Technology, Tianjin, China*, **Hanzhengnan Yu**, *China Automotive Technology & Research Center, Tianjin, China*, **Kunqi Ma**, *Hebei University of Technology, Tianjin, China*

10:06am – An Improved Optimal Adaptive Control Method for MIMO Sine Vibration Control of a Multichannel Coupled System

Technical Paper Publication. IMECE2018-86983

Li Chao, **Zhangwei Chen**, *Zhejiang University, Hangzhou, China*, **Zu Hongfei**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Zhao Yugang**, *Econ Technologies Co., Ltd., Hangzhou, China*

10:27am – Experimental Investigation on the Vibration and Noise Characteristics of the Vibration Damping Alloy Material

Technical Paper Publication. IMECE2018-87189

Xiang Ji, **Yong Chen**, **Hai Liu**, *Hebei University of Technology, Tianjin, China*, **Hanzhengnan Yu**, *China Automotive Technology & Research Center, Tianjin, China*, **Changyin Wei**, **Zhibiao Yan**, *Hebei University of Technology, Tianjin, China*

10:48am – Different Definitions of Entropy for Statistical Energy Analysis

Technical Paper Publication. IMECE2018-87240

Zahra Sotoudeh, *Cal Poly Pomona, Pomona, CA, United States*

11:09am – Objective Evaluation of FCV Interior Sound Quality During Acceleration

Technical Paper Publication. IMECE2018-87011

Hai Liu, *Hebei University of Technology, Tianjin, China*, **Yanyi Zhang**, **Dong Hao**, *China Automotive Technology and Research Center, Tianjin, China*, **Yong Chen**, **Xiang Ji**, **Changyin Wei**, *Hebei University of Technology, Tianjin, China*

1-8 VIBRATION AND ACOUSTIC MEASUREMENTS, SIGNAL PROCESSING, AND TEST FACILITIES

1-8-1 Vibration and Acoustic Measurements, Signal Processing, and Test Facilities I

Fourth Floor, David L. Lawrence Convention Center, Room 403
9:45am–11:30am

Session Chair: Kristin Cody, *Naval Nuclear Laboratory, Jefferson Hills, PA, United States*

Session Co-Chair: Zhongquan Charlie Zheng, *University of Kansas, Lawrence, KS, United States*

9:45am – Analyzing Interrelationships Between Structural Damping and Vibro-Acoustic Performances of Elastic Materials

Technical Presentation. IMECE2018-88778

Antonio Figueroa, **Mike Telenko**, *Shiloh Industries, Plymouth, MI, United States*, **Sean Wu**, **Lingguang Chen**, *Wayne State University, Detroit, MI, United States*

10:06am – Parametric Study of Helmholtz Resonator Performance and Effect of Poroacoustic Material Use in Resonator Design

Technical Presentation. IMECE2018-88750

Yasaman Esfandiari, **Atul Kelkar**, **Shan Hu**, *Iowa State University, Ames, IA, United States*

10:27am – On the Free Vibration Analysis of a Sandwich Beam With Tip Mass

Technical Paper Publication. IMECE2018-87535
Eshagh Farzaneh Joubaneh, Oumar Rafiou Barry, *Central Michigan University, Mount Pleasant, MI, United States*

10:48am – A Comprehensive Tool for Locating and Analyzing Sound Sources

Technical Presentation. IMECE2018-88800
Yazhong Lu, Linguang Chen, *Wayne State University, Detroit, MI, United States*

1-1 PHONONIC CRYSTALS AND METAMATERIALS

1-1-2 Micro and Nano Phononics

Third Floor, David L. Lawrence Convention Center, Room 301
1:45pm–3:30pm

Session Chair: Ankit Srivastava, *Illinois Institute of Technology, Chicago, IL, United States*

1:45pm – Soft Opals Beyond Hypersonic Phononics

Technical Presentation. IMECE2018-88712
Yu Cang, Zuyuan Wang, *Max Planck Institute for Polymer Research, Mainz, Germany*, Krzysztof Matyjaszewski, Micheal R. Bockstaller, *Carnegie-Mellon University, Pittsburgh, PA, United States*, George Fytas, *Max Planck Institute for Polymer Research, Mainz, Germany*

2:06pm – Direct Observation of Polymer Surface Mobility via Nanoparticle Vibrations

Technical Presentation. IMECE2018-88711
Yu Cang, Eunsoo Kang, Bartłomiej Graczykowski, *Max Planck Institute for Polymer Research, Mainz, Germany*, Hojin Kim, *University of Delaware, Newark, DE, United States*, Maria Secchi, Maurizio Montagna, *University of Trento, Trento, Italy*, Rodney D. Priestley, *Princeton University, Princeton, NJ, United States*, Eric M. Furst, *University of Delaware, Newark, DE, United States*, George Fytas, *Max Planck Institute for Polymer Research, Mainz, Germany*

2:27pm – The Effect of Randomness on the Wave Propagation Characteristics of Open-Cell Foams

Technical Presentation. IMECE2018-87861
Alireza Bayat, Stavros Gaitanaros, *Johns Hopkins University, Baltimore, MD, United States*

2:48pm – Anisotropic Sub-GHz Phonon Propagation in Fibrous Plant Cell Walls

Technical Presentation. IMECE2018-88622
Maroun Abi Ghanem, *University of California San Diego, La Jolla, CA, United States*, Liliane Khoryati, *Benaroya Research Institute at Virginia Mason, Seattle, WA, United States*, Samuel Raetz, *Le Mans Université, Le Mans, France*, Amey Khanolkar, *University of Washington, Seattle, WA, United States*, Nicholas Boechler, *University of California San Diego, La Jolla, CA, United States*, Thomas Dehoux, *Université Claude Bernard Lyon 1, Villeurbanne, France*

3:09pm – Thermal Conductivity Reduction by Full-Spectrum Phonon-Resonance Hybridizations

Technical Presentation. IMECE2018-87451
Hossein Honarvar, Mahmoud Hussein, *University of Colorado Boulder, Boulder, CO, United States*

1-3 COMPUTATIONAL ACOUSTICS

1-3-1 Computational Acoustics

Third Floor, David L. Lawrence Convention Center, Room 302
1:45pm–3:30pm

Session Chair: Sue Sung, *Ford, Dearborn, MI, United States*

Session Co-Chair: Albert Kirwan, *Electric Boat, Groton, CT, United States*

1:45pm – Modeling the Wind Turbine Profiles Assuring the Maximum Lift Force With Low-Noise Operation for Variable Wind Velocities

Technical Paper Publication. IMECE2018-86795
Victorita Radulescu, *University Politehnica of Bucharest, Bucharest, Romania*

2:06pm – An Acoustic Analogy to Evaluate the Total Acoustic Power of a Cooling Fan Using Mesh Morpher Optimizer

Technical Paper Publication. IMECE2018-86873
Mike Kheirallah, *Advanced Safety and Energy, Flint, MI, United States*, Badih Jawad, *Lawrence Technological University, Dearborn Heights, MI, United States*, Abdallah Hamieh, Liping Liu, *Lawrence Technological University, Southfield, MI, United States*

2:27pm – Structural-Acoustic Modeling and Optimization of a Submarine Pressure Hull

Technical Presentation. IMECE2018-89535
James Spain, *University of Michigan, Ann Arbor, MI, United States*, Geng Zhang, Sergey Medyanik, *MES, Ann Arbor, MI, United States*, Nickolas Vlahopoulos, *University of Michigan, Ann Arbor, MI, United States*

2:48pm – Numerical Prediction of Hood Lift and Vibration of Trailing Automobiles

Technical Presentation. IMECE2018-89627
Rodrigo Auza Gutierrez, Jack McNamara, *Ohio State University, Columbus, OH, United States*, Austin Kimbrell, Peter Kang, *Honda R&D Americas, Inc., Raymond, OH, United States*

1-8 VIBRATION AND ACOUSTIC MEASUREMENTS, SIGNAL PROCESSING, AND TEST FACILITIES

1-8-2 Vibration and Acoustic Measurements, Signal Processing, and Test Facilities II

Fourth Floor, David L. Lawrence Convention Center, Room 403
1:45pm–3:30pm

Session Chair: Robert Tomko, *Naval Nuclear Laboratory, South Park, PA, United States*

1:45pm – Use of Ultrasonic and Audio Signals to Monitor Temperature in Stratospheric Balloons

Technical Paper Publication. IMECE2018-87131

Matthew C. Jones, *South Dakota School of Mines and Technology, Westminister, CO, United States*, **Jason T. Ash**, *South Dakota School of Mines and Technology, Rapid City, SD, United States*, **Michael Smith**, *Raven Aerostar International Inc., Sulphur Springs, TX, United States*, **Charles R. Tolle**, *South Dakota School of Mines and Technology, Rapid City, SD, United States*

2:06pm – The Study of Holey Cavity in the Application of Thermoacoustics Imaging

Technical Paper Publication. IMECE2018-87757

Chang Liu, **Ashkan Ghanbarzadeh Dagheyen**, **Juan Heredia Juesas**, **Ali Molaei**, **Jose Martinez Lorenzo**, *Northeastern University, Boston, MA, United States*

2:27pm – Application of a Resonant Metamaterial Line Array in Ultrasound Compressive Imaging

Technical Paper Publication. IMECE2018-88011

Ashkan Ghanbarzadeh Dagheyen, **Ali Molaei**, **Juan Heredia Juesas**, **Jose Martinez Lorenzo**, *Northeastern University, Boston, MA, United States*

2:48pm – A Holey Cavity for High-Capacity Ultrasound Imaging

Technical Paper Publication. IMECE2018-88028

Ashkan Ghanbarzadeh Dagheyen, **Juan Heredia Juesas**, **Chang Liu**, **Ali Molaei**, **Jose Martinez Lorenzo**, *Northeastern University, Boston, MA, United States*

1-1 PHONONIC CRYSTALS AND METAMATERIALS

1-1-3 Design of Phononic Crystals and Metamaterials

Third Floor, David L. Lawrence Convention Center, Room 301
3:45pm–5:30pm

Session Chair: Nicholas Boechler, *University of Washington, Seattle, WA, United States*

3:45pm – Design of Acoustic Metamaterials Using Gradient Based Optimization

Technical Paper Publication. IMECE2018-88254

Feruzha Amirkulova, *San Jose State University, San Jose, CA, United States*, **Andrew Norris**, *Rutgers University, Piscataway, NJ, United States*

4:06pm – Broadening the Bandgaps of Sonic Crystals by Varying Shapes, Sizes, and Orientations of the Scatterers

Technical Paper Publication. IMECE2018-87398

Debasish Panda, **Amiya Ranjan Mohanty**, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

4:27pm – Broadband Control of Propagating Waves Using Smooth Changes in Flexural Rigidity: Lenses, Cloaks, and Acoustic Patterns

Technical Presentation. IMECE2018-87654

Amir Darabi, *Georgia Institute of Technology, Atlanta, GA, United States*, **Michael Leamy**, *Georgia Institute of Technology, Marietta, GA, United States*

4:48pm – Tunable Tensegrity Metastructure for Compression-Torsion Coupled Wave Control

Technical Presentation. IMECE2018-87338

Rui Zhu, **Yitian Wang**, **Xiaoning Liu**, **Gengkai Hu**, *Beijing Institute of Technology, Beijing, China*

5:09pm – A Metamaterials Design Approach From Discrete Models

Technical Presentation. IMECE2018-87903

Kathryn Matlack, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Marc Serra**, *ETH Zurich, Zurich, Switzerland*, **Antonio Palermo**, *California Institute of Technology, Pasadena, CA, United States*, **Sebastian Huber**, *ETH Zurich, Zurich, Switzerland*, **Chiara Daraio**, *California Institute of Technology, Pasadena, CA, United States*

1-6 FLOW-INDUCED ACOUSTICS AND HUMAN PERCEPTION OF NOISE

1-6-1 Flow-Induced Acoustics and Human Perception of Noise

Third Floor, David L. Lawrence Convention Center, Room 302
3:45pm–5:30pm

Session Chair: Robert Tomko, *Naval Nuclear Laboratory, South Park, PA, United States*

Session Co-Chair: Haijun Liu, *Temple University, Philadelphia, PA, United States*

3:45pm – Human Response and Perception of UAV Noise in Simulated Warehouse Environments

Technical Presentation. IMECE2018-88081

Jesse Callanan, **Payam Ghassemi**, **James Dimartino**, **Christina Stocking**, **Souma Chowdhury**, **Mostafa Nouh**, *University at Buffalo, State University of New York, Buffalo, NY, United States*

4:06pm – A Bio-Inspired Pressure Difference Receiver With Optical Detection

Technical Presentation. IMECE2018-88945

Qian Dong, **Haijun Liu**, *Temple University, Philadelphia, PA, United States*

4:27pm – Quadruple Flow and Acoustic Coincident Resonance of Rotating Bladed Disks Interacting With Stationary Elements

Technical Paper Publication. IMECE2018-86303

Frank Kushner, *Frank Kushner Consulting, Delmont, PA, United States*

4:48pm – The Physics of Deep Surge in an Automotive Turbocharger Centrifugal Compression System

Technical Paper Publication. IMECE2018-87716

Rick Dehner, Ahmet Selamet, *Ohio State University, Columbus, OH, United States*

5:09pm – Experimental Study on the Leakage and Rotordynamic Coefficients of a Long Smooth Seal at Laminar Flow Conditions

Technical Paper Publication. IMECE2018-88717

Min Zhang, *Praxair, Inc., Tonawanda, NY, United States*,
Dara Childs, *Texas A&M University, College Station, TX, United States*

1-8 VIBRATION AND ACOUSTIC MEASUREMENTS, SIGNAL PROCESSING, AND TEST FACILITIES

1-8-3 Vibration and Acoustic Measurements, Signal Processing, and Test Facilities III

**Fourth Floor, David L. Lawrence Convention Center, Room 403
3:45pm–5:30pm**

Session Chair: Kristin Cody, *Naval Nuclear Laboratory, Jefferson Hills, PA, United States*

Session Co-Chair: Zhongquan Charlie Zheng, *University of Kansas, Lawrence, KS, United States*

3:45pm – On the Dynamic Loading Effects of Soil on Plastic Water Distribution Pipes and Its Significance for Leak Detection Using Acoustics

Technical Paper Publication. IMECE2018-87420

Oscar Scussel, Michael J. Brennan, *Universidade Estadual Paulista, Ilha Solteira, São Paulo, Brazil*, **Jennifer M.**

Muggleton, *University of Southampton, Southampton, United Kingdom*, **Fabício César Lobato de Almeida**, *Universidade Estadual Paulista, Tupã, São Paulo, Brazil*, **Amarildo Tabone Paschoalini**, *Universidade Estadual Paulista, Ilha Solteira, São Paulo, Brazil*

4:06pm – Capturing BW Zone in an Intact Rotor System

Technical Paper Publication. IMECE2018-87480

Fatima Alhamadi, Mohammad AL-Shudeifat, Oleg Shirayev, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*

4:27pm – Research on the Weak Signal Detection of Bearing Fault Based on Duffing Oscillator

Technical Paper Publication. IMECE2018-86892

Long Hao, Dan Liu, Fei Liu, Qingxin Wang, Lin Liang, Guanghua Xu, *Xi'an Jiaotong University, Xi'an, China*

4:48pm – Deep Convolutional Neural Network for Early Disk Crack Diagnosis Under Variable Speed

Technical Paper Publication. IMECE2018-87247

Ruonan Liu, Ruqiang Yan, Meng Ma, Xuefeng Chen, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

TUESDAY, NOVEMBER 13

1-13 PLENARY

1-13-1 Acoustics, Vibration, and Phononics Plenary
 Third Floor, David L. Lawrence Convention Center, Room 305
 8:00am–8:45am

8:00am – Active Acoustic Metamaterials

Plenary Presentation. IMECE2018-90090

Amr Baz, *University of Maryland, College Park, MD, United States*

1-1 PHONONIC CRYSTALS AND METAMATERIALS**1-1-4 Topological Phononics I**

Third Floor, David L. Lawrence Convention Center, Room 302
 10:00am–11:45am

Session Chair: Mostafa Nough, *University at Buffalo, State University of New York, Buffalo, NY, United States*

10:00am – Topological Phononic Crystals

Technical Presentation. IMECE2018-87617

Zeguo Chen, *King Abdullah University of Science and Technology, Thuwal, Saudi Arabia*, **Jun Mei**, *South China University of Technology, Guangzhou, China*, **Ying Wu**, *King Abdullah University of Science and Technology, Thuwal, Saudi Arabia*

10:21am – One-Dimensional Linear Bidirectional Acoustic Diodes

Technical Presentation. IMECE2018-86801

Weiqiu Chen, *Zhejiang University, Hangzhou, China*

10:42am – Non-Reciprocal Wave Phenomena Through Pump-Signal Wave Interaction in Discrete Metastructures Undergoing Large Deformation

Technical Presentation. IMECE2018-87976

Samuel P. Wallen, **Benjamin M. Goldsberry**, **Michael R. Haberman**, *University of Texas at Austin, Austin, TX, United States*

11:03am – Use of Betti-Reciprocity in Metamaterials

Technical Presentation. IMECE2018-86358

Amir Ashkan Mokhtari, **Ankit Srivastava**, *Illinois Institute of Technology, Chicago, IL, United States*

11:24am – Demonstration of Topological Waveguiding in Locally Resonant Plate Structures

Technical Presentation. IMECE2018-87774

Rajesh Chaunsali, **Chun-Wei Chen**, **Jinkyu Yang**, *University of Washington, Seattle, WA, United States*

1-4 STRUCTURAL-ACOUSTIC SYSTEM IDENTIFICATION**1-4-1 Structural-Acoustic System Identification**

Fourth Floor, David L. Lawrence Convention Center, Room 405
 10:00am–11:45am

Session Chair: Weidong Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*

Session Co-Chair: Yongfeng Xu, *University of Cincinnati, Cincinnati, OH, United States*

10:00am – Detection of Misfire in a Six-Cylinder Diesel Engine Using Acoustic Emission Signals

Technical Paper Publication. IMECE2018-86506

Mohammad Jafari, *Queensland University of Technology, Brisbane, Queensland, Australia*, **Pietro Borghesani**, *University of New South Wales, Sydney, New South Wales, Australia*, **Puneet Verma**, *Queensland University of Technology, Brisbane, Queensland, Australia*, **Ashkan Eslaminejad**, *North Dakota State University, Fargo, ND, United States*, **Zoran D. Ristovski**, **Richard J. Brown**, *Queensland University of Technology, Brisbane, Queensland, Australia*

10:21am – An Acoustic Field Reconstruction Method of Near-Field Acoustic Radiation Modes Decomposition

Technical Presentation. IMECE2018-88940

Jie Wang, *Zhejiang University of Technology, Zhejiang, Zhejiang, China*, **Zubin Liu**, *Zhejiang University of Technology, Hangzhou, Zhejiang, China*, **Liyang Jiang**, *Zhejiang University of Technology, Zhejiang, China*, **Huancai Lu**, *Zhejiang University of Technology, Hangzhou, China*

10:42am – Operational Modal Analysis and Damage Identification of Structures Undergoing Random Vibration Using a Continuously Scanning Laser Doppler Vibrometer System

Technical Paper Publication. IMECE2018-88058

Daming Chen, *University of Maryland, Baltimore County, Baltimore, MD, United States*, **Yongfeng Xu**, *University of Cincinnati, Cincinnati, OH, United States*, **Weidong Zhu**, *University of Maryland, Baltimore County, Baltimore, MD, United States*

11:03am – Reducing Structure-Borne Sound Radiation via Vibro-Acoustic Analysis

Technical Presentation. IMECE2018-88769

Lingguang Chen, **Sean Wu**, **Yazhong Lu**, *Wayne State University, Detroit, MI, United States*

11:24am – Nonlinear Vibration Analysis of a Fractional Viscoelastic Euler-Bernoulli Microbeam

Technical Paper Publication. IMECE2018-87061

Firooz Bakhtiari-Nejad, **Ehsan Loghman**, **Mostafa Pirasteh**, *Amirkabir University of Technology, Tehran, MD, United States*

1-12 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM: ULTRASONIC WAVES FOR MATERIAL CHARACTERIZATION AND DAMAGE ASSESSMENT

1-12-1 NDE & SHM: Ultrasonic Waves for Material Characterization and Damage Assessment

Third Floor, David L. Lawrence Convention Center, Room 301
10:00am–11:45am

Session Chair: Yongfeng Xu, *University of Cincinnati, Cincinnati, OH, United States*

Session Co-Chairs: Weidong Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*, Firooz Bakhtiari-Nejad, *Amirkabir University of Technology, Tehran, MD, United States*

10:00am – Elasto-Plastic Modeling of Beams for Impedance Based Structural Health Monitoring Technical Paper Publication. IMECE2018-87910

Naserodin Sepehry, *Shahrood University of Technology, Shahrood, Iran*, Firooz Bakhtiari-Nejad, *Amirkabir University of Technology, Tehran, MD, United States*, Weidong Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*

10:21am – Real-Time Imaging of Damage Precursors in Complex Composites

Technical Presentation. IMECE2018-88816
Fateme Pourahmadian, *University of Colorado Boulder, Boulder, CO, United States*

10:42am – Computational Time- Domain Wave Modeling in Anisotropic Plate

Technical Presentation. IMECE2018-88863
Sajan Shrestha, Sourav Banerjee, *University of South Carolina, Columbia, SC, United States*

11:03am – Passive Extraction of Green's Function of Solids and Application to High-Speed Rail Inspection

Technical Presentation. IMECE2018-89371
Francesco Lanza Di Scalea, Albert Liang, Simone Sternini, Margherita Capriotti, *University of California San Diego, La Jolla, CA, United States*

11:24am – Generation and Propagation of Rayleigh Surface Wave in Anisotropic Materials by Line-Focus Ultrasonic Transducer

Technical Presentation. IMECE2018-88278
Qiuyan Li, Chenglong Ji, Yuxiang Wang, Qing-Ming Wang, *University of Pittsburgh, Pittsburgh, PA, United States*

1-1 PHONONIC CRYSTALS AND METAMATERIALS

1-1-5 Topological Phononics II

Third Floor, David L. Lawrence Convention Center, Room 301
1:45pm–3:30pm

Session Chair: Jinkyu Yang, *University of Washington, Seattle, WA, United States*

1:45pm – The Applicability of the Principle of Reciprocity in Acoustic Metamaterials

Technical Presentation. IMECE2018-88611
Allan Pierce, *Retired, East Sandwich, MA, United States*

2:06pm – Topological Mechanics of Edge Waves in Kagome Lattices

Technical Presentation. IMECE2018-88195
Hui Chen, Hussein Nassar, Guoliang Huang, *University of Missouri, Columbia, MO, United States*

2:27pm – Experimental Observation of Valley-Hall Edge States in Elastic Waveguides Based on Diatomic-Graphene-Like Phononic Crystals

Technical Presentation. IMECE2018-89423
Hongfei Zhu, Fabio Semperlotti, Ting-Wei Liu, *Purdue University, West Lafayette, IN, United States*

2:48pm – Universal Wave Manipulation by Periodic Gyro-Elastic Structures

Technical Presentation. IMECE2018-88926
Mohammad Ali Attarzadeh, *University at Buffalo, State University of New York, Tonawanda, NY, United States*, Mostafa Nouh, *University at Buffalo, State University of New York, Buffalo, NY, United States*

1-1-6 Theory, Computation, and Experiments in Phononics

Third Floor, David L. Lawrence Convention Center, Room 302
1:45pm–3:30pm

Session Chair: Kathryn Matlack, *University of Illinois Urbana-Champaign, Urbana, IL, United States*

1:45pm – Study on Generation of Dual-Dirac Cone at $k_x = 0$ and Its Features by Angle Based Tunable Engineered Phononic Crystal

Technical Presentation. IMECE2018-89099
Mustahseen Indaleeb, Hossain Ahmed, Sourav Banerjee, *University of South Carolina, Columbia, SC, United States*

2:06pm – Modeling and Experimentation on 3D Printed Decoupled and Mixed Mode Mechanical Metamaterials

Technical Presentation. IMECE2018-88336
Alireza Amirkhizi, Fateme Aghighi, Joshua Morris, Weidi Wang, *University of Massachusetts, Lowell, Lowell, MA, United States*

2:27pm – Deep Convolutional Neural Networks for Eigenvalue Problems in Mechanics

Technical Presentation. IMECE2018-87281

David Finol, Yan Lu, *Illinois Institute of Technology, Chicago, IL, United States*, Vijay Mahadevan, *Amazon AWS AI, Seattle, IL, United States*, Ankit Srivastava, *Illinois Institute of Technology, Chicago, IL, United States*

2:48pm – The Phononic Problem Under the Spectral Theorem

Technical Presentation. IMECE2018-89670

Ankit Srivastava, *Illinois Institute of Technology, Chicago, IL, United States*

1-11 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM: ACOUSTIC AND VIBRATION METHODS IN STRUCTURAL HEALTH MONITORING AND NONDESTRUCTIVE TESTING

1-11-1 NDE & SHM: Acoustic and Vibration Methods in Structural Health Monitoring and Nondestructive Testing

Fourth Floor, David L. Lawrence Convention Center, Room 405
1:45pm–3:30pm

Session Chair: Weidong Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*

Session Co-Chair: Yongfeng Xu, *University of Cincinnati, Cincinnati, OH, United States*

1:45pm – Effect of Angular Acceleration and Unbalance Force Orientation on the Backward Whirl in Cracked Rotors

Technical Paper Publication. IMECE2018-87476

Fatima Alhammedi, Mohammad AL-Shudeifat, Oleg Shiryayev, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*

2:06pm – A Nondestructive Evaluation Method Based on the Propagation of Nonlinear Solitary Waves

Technical Presentation. IMECE2018-87555

Amir Nasrollahi, Piervincenzo Rizzo, *University of Pittsburgh, Pittsburgh, PA, United States*

2:27pm – Transmission of Information by Acoustic Communication Along Metal Pathways in Nuclear Facilities

Technical Presentation. IMECE2018-88155

Alexander Heifetz, Richard Vilim, Sasan Bakhtiari, *Argonne National Laboratory, Lemont, IL, United States*

2:48pm – “Flute Without Flute” An Experiment in Turbulence Management

Technical Presentation. IMECE2018-88722

B.G. Shiva Prasad, *Fluid Thermal Technologies, Sidney, OH, United States*

1-1 PHONONIC CRYSTALS AND METAMATERIALS

1-1-7 Control of Phononic Crystals and Metamaterials

Third Floor, David L. Lawrence Convention Center, Room 301
3:45pm–5:30pm

Session Chair: Mahmoud Hussein, *University of Colorado Boulder, Boulder, CO, United States*

Session Co-Chair: Liang-Wu Cai, *Kansas State University, Manhattan, KS, United States*

3:45pm – Active Acoustic Metamaterials with Programmable Densities Using an H_∞ Controller

Technical Paper Publication. IMECE2018-87749

Amr Baz, *University of Maryland, College Park, MD, United States*

4:06pm – A Programmable Metasurface for Real Time Control of Broadband Elastic Rays

Technical Presentation. IMECE2018-88554

Yangyang Chen, Xiaopeng Li, Hussein Nassar, Guoliang Huang, *University of Missouri, Columbia, MO, United States*

4:27pm – The Auxetic Nature of Shunted Piezoelectrics

Technical Presentation. IMECE2018-89490

Carson Willey, *UES, Inc./AFRL, WPAFB, OH, United States*, Philip Buskohl, Abigail Juhl, *AFRL/RXAS, WPAFB, OH, United States*

4:48pm – Tunable Phononic Crystals With Kirigami-Based Structures

Technical Presentation. IMECE2018-88877

Ronghao Bao, *Zhejiang University, Hangzhou, Zhejiang, China*

5:09pm – 3D Printed Magnetorheological Elastomer Metastructures With Magnetically Tunable Band Gaps

Technical Presentation. IMECE2018-89586

Connor D. Pierce, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Vincent Chen, James Hardin, Carson Willey, *UES, Inc./AFRL, WPAFB, OH, United States*, Dan Berrigan, *Air Force Research Laboratory, WPAFB, OH, United States*, Abigail Juhl, *AFRL/RXAS, WPAFB, OH, United States*, Kathryn Matlack, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

TRACK 2 ADVANCED MANUFACTURING

- 2-1-1: **Advanced Manufacturing Plenary**
- 2-11-1: **Advanced Manufacturing Processes-Modeling and Simulation I**
- 2-11-2: **Advanced Manufacturing Processes-Modeling and Simulation II**
- 2-11-3: **Advanced Manufacturing Processes-Modeling and Simulation III**
- 2-11-4: **Advanced Manufacturing Processes-Modeling and Simulation V**
- 2-12-1: **Variation Simulation and Design for Assembly I**
- 2-12-2: **Variation Simulation and Design for Assembly II**
- 2-13-1: **Congress-Wide Symposium on Additive Manufacturing: Robotic Additive Manufacturing**
- 2-13-2: **Manipulators and Interfaces**
- 2-13-3: **Algorithms and Optimization**
- 2-14-1: **Surface Modification based on Laser Peening and Ablation**
- 2-14-2: **Laser-Matter Interaction and Its Applications in Materials Processing**
- 2-15-1: **Digital Manufacturing in Cyber-Manufacturing Aspects**
- 2-15-2: **Digital Manufacturing in Digital Twin Aspects**
- 2-15-3: **Digital Manufacturing in Industry 4.0 Aspects**
- 2-2-1: **Congress-Wide Symposium on Additive Manufacturing: Metals – Directed Energy Deposition I**
- 2-2-2: **Congress-Wide Symposium on Additive Manufacturing: Metals – Directed Energy Deposition II**
- 2-2-3: **Congress-Wide Symposium on Additive Manufacturing: Metals – Powder Bed Fusion I**
- 2-2-4: **Congress-Wide Symposium on Additive Manufacturing: Metals – Powder Bed Fusion II**
- 2-2-5: **Congress-Wide Symposium on Additive Manufacturing: Polymers I**
- 2-2-6: **Congress-Wide Symposium on Additive Manufacturing: Polymers II**
- 2-2-7: **Congress-Wide Symposium on Additive Manufacturing: Composites/Ceramics & Bio-Applications**
- 2-4-1: **Nanomanufacturing: Spray or Print Deposition Techniques for Nanomaterials and Nanostructures**
- 2-4-2: **Nanomanufacturing: Nanomaterials Synthesis and Assembly**
- 2-4-3: **Nanomanufacturing: Integration of Nanoscale Materials or Textures for Enhanced Performance**
- 2-5-1: **Mechanics and Physics of 2D Materials**
- 2-5-2: **Sensors and Electronics of 2D Materials**
- 2-5-3: **Synthesis and Processing of 2D Materials**
- 2-6-1: **Advanced Surface Modification Using Machining**
- 2-6-2: **Conventional Machining**
- 2-6-3: **Assisted Machining Techniques**
- 2-6-4: **Nontraditional Machining Processes**
- 2-6-5: **Machinability of Engineering Materials**
- 2-6-6: **Cutting Tool Performance and Treatment**
- 2-7-1: **Bonded Joint and Bolted Joint Technologies**
- 2-7-2: **Welding Performance Evaluation and Simulation**
- 2-8-1: **Novel Processes**
- 2-8-2: **Formability – I**
- 2-8-3: **Formability – II**
- 2-8-4: **Testing and Defects**
- 2-9-1: **Innovative Product Design I**
- 2-9-2: **Innovative Product Design II**

ACKNOWLEDGMENT

Track Organizers

Junghoon Yeom, *Michigan State University, United States*
 Ruth Jill Urbanic, *University of Windsor, Canada*
 William Emblom, *University of Louisiana-Lafayette, United States*
 Marriner Merrill, *US Naval Research Laboratory, United States*

Topic Organizers

Junghoon Yeom, *Michigan State University, United States*
 Ruth Jill Urbanic, *University of Windsor, Canada*
 Scott Thompson, *Auburn University, United States*
 Nima Shamsaei, *Auburn University, United States*
 Mehran Tehrani, *University of New Mexico, United States*
 Matt Maschmann, *University of Missouri, United States*
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 Pilgyu Kang, *George Mason University, United States*
 SungWoo Nam, *University of Illinois, Urbana-Champaign (UIUC), United States*
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 Chang Ye, *University of Akron, United States*
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 Sayed Nassar, *Oakland University, United States*
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 Chetan Nikhare, *Pennsylvania State University, United States*
 Scott Wagner, *Michigan Tech, United States*
 Ricardo Jardim-Goncalves, *Universidade Nova De Lisboa - Faculdade De Cincias E Tecnologia, Portugal*
 Joao Silva, *Universidade do Minho, Portugal*
 David Romero, *ITEMS, Mexico*
 Siddharthsinh Jadeja, *Aditya Silver Oak Institute of Technology, India*

Jianfeng Ma, *Saint Louis University, United States*
 Yucheng Liu, *Mississippi State University, United States*
 Stephanie Wimmer, *Naval Research Laboratory, United States*
 Kristina Wärmefjord, *Chalmers University of Technology, Sweden*
 Hua Wang, *Shanghai Jiao Tong University, China*
 Daniel Cox, *Georgia Southern University, United States*
 Andrzej Nycz, *Oak Ridge National Laboratory, United States*
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 Yeqing Wang, *Mississippi State University, United States*
 David Guerra-Zubiaga, *Kennesaw State University, United States*
 Germanico Gonzalez-Badillo, *Universidad Autonoma De San Luis Potosi, Mexico*
 Kai He, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China*

Session Organizers

Roosbeh (Ross) Salary, *Marshall University, United States*
 Scott Thompson, *Auburn University, United States*
 Nima Shamsaei, *Auburn University, United States*
 Ruth Jill Urbanic, *University of Windsor, Canada*
 Albert To, *University of Pittsburgh, United States*
 Mehran Tehrani, *University of New Mexico, United States*
 Junghoon Yeom, *Michigan State University, United States*
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 Sayed Nassar, *Oakland University, United States*
 Thomas Whitney, *University of Dayton, United States*
 Chetan Nikhare, *Pennsylvania State University, United States*
 Molla Hasan, *Department of Mechanical and Aerospace Engineering, Rutgers, United States*
 Ricardo Jardim-Goncalves, *Universidade Nova De Lisboa - Faculdade De Cincias E Tecnologia, Portugal*
 Joao Silva, *Universidade do Minho, Portugal*
 Joao Sarraipa, *UNINOVA - DEE/FCT/UNL, Portugal*
 Virginia DeGiorgi, *Naval Research Lab, United States*
 Yucheng Liu, *Mississippi State University, United States*
 Jose Teixeira, *University of Minho, Portugal*
 Tien-Chien Jen, *University of Johannesburg, South Africa*
 Hua Wang, *Shanghai Jiao Tong University, China*
 Sriharsha Srinivas Sundarram, *Fairfield University, United States*
 Germanico Gonzalez-Badillo, *Universidad Autonoma De San Luis Potosi, Mexico*

**TRACK 2
ADVANCED MANUFACTURING
WEDNESDAY, NOVEMBER 14**

**2-1 ADVANCED MANUFACTURING
PLENARY**

2-1-1 Advanced Manufacturing Plenary
Third Floor, David L. Lawrence Convention Center, Room 305
9:00am–9:45am

9:00am – Manufacturing for X
Plenary Presentation. IMECE2018-90091
Jian Cao, Northwestern University, Evanston, IL, United States

**2-2 CONGRESS-WIDE SYMPOSIUM ON
ADDITIVE MANUFACTURING**

**2-2-1 Congress-Wide Symposium on Additive
Manufacturing: Metals-Directed Energy Deposition I**
Third Floor, David L. Lawrence Convention Center, Room 301
10:00am–11:45am

Session Chair: Scott Thompson, Auburn University, Auburn, AL, United States

Session Co-Chairs: Nima Shamsaei, Auburn University, Auburn, AL, United States, Roozbeh (Ross) Salary, Marshall University, Huntington, WV, United States

**10:00am – Thermal-Mechanical Study of 3D Printing
Technology for Rail Repair**
Technical Paper Publication. IMECE2018-86315
Ershad Mortazavian, Zhiyong Wang, University of Nevada, Las Vegas, Las Vegas, NV, United States, Hualiang Teng, University of Nevada, Las Vegas, Henderson, NV, United States

**10:21am – Additive Manufacturing Bead Deposition Based
Rotary Tool Path Applications**
Technical Paper Publication. IMECE2018-86461
Ruth Jill Urbanic, University of Windsor, La Salle, ON, Canada, Robert Hedrick, CAMufacturing Solutions Inc., La Salle, ON, Canada

**10:42am – Directed Energy Deposition of Magnetic Shape
Memory Alloy Ni-Mn-Ga: Towards Epitaxial Growth**
Technical Presentation. IMECE2018-87160
Jakub Toman, University of Pittsburgh, Pittsburgh, PA, United States, Peter Müllner, Boise State University, Boise, ID, United States, Markus Chmielus, University of Pittsburgh, Pittsburgh, PA, United States

**11:03am – ODS Coating for Critical Turbine Components
Using DED Additive Manufacturing**
Technical Paper Publication. IMECE2018-87512
Eric Chia, Bruce Kang, West Virginia University, Morgantown, WV, United States, Zheng Min, University of Pittsburgh, Wexford, PA, United States, Yang Li, Minking Chyu, University of Pittsburgh, Pittsburgh, PA, United States

**11:24am – Effect of Welding Mode on Microstructure and
Mechanical Properties of Aluminum Fabricated by Wire and
Arc Additive Manufacturing**
Technical Presentation. IMECE2018-88703
Xuewei Fang, Lijuan Zhang, Bingheng Lu, Xi'an Jiaotong University, Xi'an, China

**2-5 MANUFACTURING OF ATOMICALLY-
THIN, TWO-DIMENSIONAL MATERIALS**

2-5-1 Mechanics and Physics of 2D Materials
Third Floor, David L. Lawrence Convention Center, Room 304
10:00am–11:45am

Session Chair: Pilgyu Kang, George Mason University, Fairfax, VA, United States

Session Co-Chairs: SungWoo Nam, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Mike Cai Wang, University of South Florida, Tampa, FL, United States

**10:00am – Large-Area Solution-Manufactured Air-Stable 2D
Material for High-Performance Electronics and Smart
Sensors**

Invited Presentation. IMECE2018-86603
Wenzhuo Wu, Purdue University, West Lafayette, IN, United States

**10:42am – Large-Scale Nano-Manufacturing of Highly-
Uniform 0D/1D/2D Heterostructures via Self-Assembly**
Technical Presentation. IMECE2018-89830
Michael Cai Wang, University of South Florida, Tampa, FL, United States, Matthew Thomas Gole, Juyoung Leem, Wayne Lin, Rachel Ziran Zhou, Paolo Furlanetto Ferrari, Arend van der Zande, Catherine Jones Murphy, SungWoo Nam, University of Illinois at Urbana-Champaign, Urbana, IL, United States

**11:03am – Spatial Nanomechanical Mapping of Graphene
Monolayers on Crystalline Substrates**
Technical Presentation. IMECE2018-89489
Matt Robertson, Kaihao Zhang, Matt Poss, Sameh Tawfick, University of Illinois at Urbana-Champaign, Urbana, IL, United States

**11:24am – Anomalous Corrosion Dynamics of Two-
Dimensional (2D) Layered Materials**
Technical Presentation. IMECE2018-89856
Yu-ting Huang, Honk Kong University, Pok Fu Lam, Hong Kong, Hong Kong, Akhil Dodda, Pennsylvania State University, State College, PA, United States, Amritanand Sebastian, Pennsylvania State University, University Park, PA, United States, Daniel Schulman, Penn State University, University Park, PA, United States, Saptarshi Das, Pennsylvania State University, State College, PA, United States

2-6 ADVANCED MACHINING AND FINISHING

2-6-1 Advanced Surface Modification Using Machining

Third Floor, David L. Lawrence Convention Center, Room 305
10:00am–11:45am

Session Chair: Pawan Tyagi, *University of the District of Columbia, Washington, DC, United States*

Session Co-Chair: Muhammad Jahan, *Miami University, Oxford, OH, United States*

10:00am – Study on Grinding Force and Surface Roughness of Ni3Al Based Superalloy

Technical Paper Publication. IMECE2018-86959
Xiaoxiang Zhu, Wenhu Wang, Ruisong Jiang, Xiaofen Liu, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*

10:21am – Scanning Electron Microscopy and Optical Profilometry of Electropolished Additively Manufactured 316 Steel Components

Technical Paper Publication. IMECE2018-88339
Pawan Tyagi, Tobias Goulet, Denikka Brent, *University of the District of Columbia, Washington, DC, United States,* **Francisco Garcia-Moreno,** *Department of Energy's National Security Campus, managed by Honeywell, Kansas City, MO, United States,* **Kate Klein,** *University of the District of Columbia, Washington, DC, United States*

10:42am – Chemical Polishing Based Surface Finishing of 3D Printed Steel Components

Technical Paper Publication. IMECE2018-88378
Pawan Tyagi, Tobias Goulet, Nitt Chuenprateep, Robert Stephenson, Rudolph Knott, Antione Reddick, *University of the District of Columbia, Washington, DC, United States,* **Justin Schlitzer, Francisco Garcia-Moreno, Cordell Benton,** *Kansas City National Security Campus, managed by Honeywell, Kansas City, MO, United States,* **Devdas Shetty,** *University of the District of Columbia, Washington, DC, United States*

11:03am – Improved Mechanical Properties and Hierarchical Surfaces of 316 Stainless Steel Processed by Ultrasonic Nanocrystal Surface Modification

Technical Presentation. IMECE2018-89950
Xiaoning Hou, Jun Liu, Hao Zhang, Gary Doll, *University of Akron, Akron, OH, United States,* **Ashlie Martini,** *University of California -Merced, Atwater, CA, United States,* **Yalin Dong,** *University of Akron, Akron, OH, United States,* **Chang Ye,** *University of Akron, Peninsula, OH, United States*

11:24am – Influence of Surface Pretreatment on the Hydrophobic Silane Coating on AISI 304 Steel

Technical Paper Publication. IMECE2018-86256
Akinsanya Damilare Baruwa, *University of Johannesburg, Johannesburg, Gauteng, South Africa,* **Oluseyi Philip Oladajo,** *Botswana International University of Science and Technology, Palapye, Palapye, Botswana,* **Nthabiseng Maledi,** *University of the Witwatersrand, Johannesburg, Gauteng, South Africa,* **Esther Akinlabi,** *University of Johannesburg, Johannesburg, South Africa*

2-13 ROBOTICS & AUTOMATION IN ADVANCED MANUFACTURING

2-13-1 Congress-Wide Symposium on Additive Manufacturing: Robotic Additive Manufacturing

Third Floor, David L. Lawrence Convention Center, Room 302
10:00am–11:45am

Session Chair: Daniel Cox, *Georgia Southern University, Statesboro, GA, United States*

Session Co-Chair: Andrzej Nycz, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

10:00am – High-Throughput 3D Metal Printing

Technical Presentation. IMECE2018-87216
Michael R. Sullivan, Deborah D.L. Chung, *University at Buffalo, State University of New York, Buffalo, NY, United States*

10:21am – The Effects of Direct Energy Deposition Processes on the Thermal Properties of Invar

Technical Presentation. IMECE2018-89770
Alex Arbogast, *Oak Ridge National Laboratory, Knoxville, TN, United States,* **Mark W. Noakes, Christopher Masuo, Andrzej Nycz,** *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

10:42am – Weld Pool and Bead Characterization for Gravity Aligned (GA) and Non-Gravity Aligned (NGA) Wire-Arc Additive Manufacturing

Technical Presentation. IMECE2018-89787
Joshua Penney, William Hamel, J.L. McNeil, *University of Tennessee, Knoxville, TN, United States*

11:03am – A Framework for Path Planning of Large Scale Additive Metals Manufacturing in Arbitrary Directions

Technical Presentation. IMECE2018-89824
James McNeil, William Hamel, Josh Penney, *University of Tennessee, Knoxville, TN, United States*

11:24am – Effect of Shielding Gas on Metal Big Area Additive Manufacturing

Technical Presentation. IMECE2018-89723
Bishal Silwal, *Georgia Southern University, Statesboro, GA, United States,* **Andrzej Nycz, Mark W. Noakes, Christopher Masuo,** *Oak Ridge National Laboratory, Oak Ridge, TN, United States,* **Derek Vaughan,** *University of Purdue, West Lafayette, IN, United States,* **David Marsh,** *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

2-14 LASER-BASED ADVANCED MANUFACTURING AND MATERIALS PROCESSING

2-14-1 Surface Modification based on Laser Peening and Ablation

Third Floor, David L. Lawrence Convention Center, Room 306
10:00am–11:45am

Session Chair: Yeqing Wang, *Mississippi State University, Mississippi State, MS, United States*

Session Co-Chair: Chang Ye, *University of Akron, Peninsula, OH, United States*

10:00am – Ablation Characteristics of Nanosecond Laser Pulsed Ablation of Aluminum

Technical Paper Publication. IMECE2018-87635

Yeqing Wang, *Mississippi State University, Mississippi State, MS, United States*, **Daniel Diaz, David Hahn**, *University of Florida, Gainesville, FL, United States*

10:21am – Improvement of Fatigue Life of Tool Steel by Laser Shock Peening

Technical Presentation. IMECE2018-88868

Sachin Patil, *Bharat Forge Ltd., Pune, Maharashtra, India*

10:42am – Microstructure Evolution in Ti64 Subjected to Laser-Assisted Ultrasonic Nanocrystal Surface Modification

Technical Presentation. IMECE2018-89553

Jun Liu, *University of Akron, Akron, OH, United States*, **Sergey Suslov**, *Qatar Environment and Energy Research Institute, Doha, Qatar*, **Zhencheng Ren, Yalin Dong**, *University of Akron, Akron, OH, United States*, **Chang Ye**, *University of Akron, Peninsula, OH, United States*

11:03am – The Effects of Laser Shock Peening on the Mechanical Properties and Biomedical Behavior of AZ31B Magnesium Alloy

Technical Presentation. IMECE2018-89781

Chang Ye, *University of Akron, Peninsula, OH, United States*, **Ruixia Zhang**, *University of Akron, Akron, OH, United States*, **Xianfeng Zhou**, *Qingdao University of Science and Engineering, Qingdao, China*, **Hongyu Gao**, *Saarland University, Saarbrücken, Germany*, **Steven Mankoci**, *University of Akron, Akron, OH, United States*, **Yang Liu**, *North Carolina State University, Raleigh, NC, United States*, **Xiahan Sang**, *Center for Nanophase Materials Sciences, ORNL, Oak Ridge, TN, United States*, **Haifeng Qin, Xiaoning Hou, Zhencheng Ren, Gary Doll**, *University of Akron, Akron, OH, United States*, **Ashlie Martini**, *University of California-Merced, Atwater, CA, United States*, **Yalin Dong, Nita Sahai**, *University of Akron, Akron, OH, United States*

11:24am – Effect of Electron Beam Weld Bead Geometry on the Mechanical Properties of Ti6Al4V Alloy

Technical Presentation. IMECE2018-88866

Sandeep Thakare, *Kalyani Centre for Technology and Innovation, Bharat Forge Ltd., Pune, Maharashtra, India*

2-15 DIGITAL MANUFACTURING SIMULATION AND VALIDATION

2-15-1 Digital Manufacturing in Cyber-Manufacturing Aspects

Third Floor, David L. Lawrence Convention Center, Room 303
10:00am–11:45am

Session Chair: David Guerra-Zubiaga, *Kennesaw State University, Marietta, GA, United States*

Session Co-Chair: Kai He, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China*, *Shenzhen, China*, **Germanico Gonzalez-Badillo**, *Universidad Autonoma de San Luis Potosi, Rioverde San Luis Potosi, Mexico*

10:00am – Taxonomy for Secure CyberManufacturing Systems

Technical Paper Publication. IMECE2018-86091

Mingtao Wu, *Syracuse University, Fayetteville, NY, United States*, **Young Moon**, *Syracuse University, Syracuse, NY, United States*

10:21am – A Novel Framework in Manufacturing Automation to Implement Cyber-Manufacturing Systems

Technical Paper Publication. IMECE2018-88243

David Guerra-Zubiaga, *Kennesaw State University, Marietta, GA, United States*, **Kathy Schwaig**, *Kennesaw State University, Kennesaw, GA, United States*, **Mason Felix, John Calfee, Aubrey Sims**, *Kennesaw State University, Marietta, GA, United States*, **Tu Vo**, *Kennesaw State University, Kennesaw, GA, United States*

10:42am – CyberManufacturing System: A Solution for Sustainable Manufacturing

Technical Paper Publication. IMECE2018-86092

Zhengyi Song, Young Moon, *Syracuse University, Syracuse, NY, United States*

11:03am – An Internet-of-Things Based Framework for Collaborative Cyber Physical Tasks in Micro Assembly

Technical Paper Publication. IMECE2018-88542

J. Cecil, Aaron Cecil-Xavier, Sadiq Albuhamood, *Oklahoma State University, Stillwater, OK, United States*

11:24am – A New Design of Cycloidal Planetary Reducer With Internal Cycloidal Profile

Technical Paper Publication. IMECE2018-86184

He Mao, Guanyi Liu, Deqiang Zeng, Yaning Cao, Kai He, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China*, **Ruxu Du**, *Chinese University of Hong Kong, Hong Kong, Hong Kong*

2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

2-2-2 Congress-Wide Symposium on Additive Manufacturing: Metals-Directed Energy Deposition II
Third Floor, David L. Lawrence Convention Center, Room 301
1:45pm–3:30pm

Session Chair: Scott Thompson, *Auburn University, Auburn, AL, United States*

Session Co-Chairs: Nima Shamsaei, *Auburn University, Auburn, AL, United States*, Ruth Jill Urbanic, *University of Windsor, La Salle, ON, Canada*

1:45pm – Application of Electrostatic Adhesion Method in Metal-Powder-Based Additive Manufacturing Layer-Forming Process

Technical Paper Publication. IMECE2018-88741
Teng-Yueh Tsao, Jen-Yuan (James) Chang, *National Tsing Hua University, Hsinchu, Hsinchu, Taiwan*

2:27pm – Meshfree Simulation of Oxide Dispersion in Solid-State Additive Manufacturing of Aluminum Alloys
Technical Presentation. IMECE2018-89026

Robert Escobar Jr., *University of Alabama, Tuscaloosa, AL, United States*, **Kirk Fraser,** *National Research Council Canada, Saguenay, QC, Canada*, **J.B. Jordon, Paul Allison,** *University of Alabama, Tuscaloosa, AL, United States*

2:48pm – Application of a Fast-Solving Semi-Analytical Heat Transfer Model to Additive Manufacturing Alloy Development

Technical Presentation. IMECE2018-89880
Nicholas Jones, Jack Beuth, Bryan Webler, Yining He, *Carnegie Mellon University, Pittsburgh, PA, United States*

3:09pm – A Computational Fluid Dynamics (CFD) Study of Material Transport and Deposition in Aerosol Jet Printing (AJP) Process

Technical Paper Publication. IMECE2018-87647
Roozbeh (Ross) Salary, *Marshall University, Huntington, WV, United States*, **Jack P. Lombardi III, Darshana L. Weerawarne,** *State University of New York at Binghamton, Vestal, NY, United States*, **Prahalad Rao,** *University of Nebraska–Lincoln, Lincoln, NE, United States*, **Mark D. Poliks,** *State University of New York at Binghamton, Vestal, NY, United States*

2-5 MANUFACTURING OF ATOMICALLY-THIN, TWO-DIMENSIONAL MATERIALS

2-5-2 Sensors and Electronics of 2D Materials
Third Floor, David L. Lawrence Convention Center, Room 304
1:45pm–3:30pm

Session Chair: Pilgyu Kang, *George Mason University, Fairfax, VA, United States*

Session Co-Chairs: Mike Cai Wang, *University of South Florida, Tampa, FL, United States*, SungWoo Nam, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

1:45pm – 2D Materials Based Epidermal and Implantable Conformal Bioelectronics

Invited Presentation. IMECE2018-89975
Nanshu Lu, *University of Texas at Austin, Austin, TX, United States*

2:27pm – Air Stable Black Phosphorous Sensors for Humidity Detection

Technical Presentation. IMECE2018-89891
Jinshui Miao, Junghoon Yeom, *Michigan State University, East Lansing, MI, United States*, **Chuan Wang,** *Washington University in St. Louis, St. Louis, MO, United States*

2:48pm – Crumple Nanostructuring of Atomically-Thin Two-Dimensional (2D) Materials for Flexible Optoelectronic Devices and Plasmonic Metamaterials

Technical Presentation. IMECE2018-89943
Pilgyu Kang, *George Mason University, Fairfax, VA, United States*

2-6 ADVANCED MACHINING AND FINISHING

2-6-2 Conventional Machining
Third Floor, David L. Lawrence Convention Center, Room 305
1:45pm–3:30pm

Session Chair: Lewis Payton, *Auburn University, Auburn University, AL, United States*

Session Co-Chair: P.V.M. Rao, *IIT Delhi, New Delhi, India*

1:45pm – Determining Cutting Pressure Coefficients for Aluminum 6061-T6 Using a Small Number of Drilling Experiments

Technical Paper Publication. IMECE2018-86224
Charbel Seif, *American University of Beirut, Beirut, Lebanon*, **Ilige Hage,** *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, **Ramsey Hamade,** *American University of Beirut, Beirut, Riad El Solh, Lebanon*

2:06pm – Dislocation Theory of Orthogonal Metal Cutting of Cu-Zn Alloys

Technical Paper Publication. IMECE2018-87634
Lewis Payton, *Auburn University, Auburn University, AL, United States*

2:27pm – Study on Turning of Non-Axisymmetric Three-Dimensional Curved Surfaces**Technical Paper Publication. IMECE2018-87377****Taichi Mori, Yoshitaka Morimoto, Akio Hayashi, Kanazawa Institute of Technology, Nonoichi, Isikawa, Japan, Yoshiyuki Kaneko, Naohiko Suzuki, Ryo Hirono, Takamatsu Machinery Co., Ltd., Isikawa, Isikawa, Japan****2:48pm – Orthogonal Machining of Copper Alloy with a Hardness Gradient****Technical Paper Publication. IMECE2018-87524****Lewis Payton, Auburn University, Auburn University, AL, United States****3:09pm – Process Planning Strategies to Reduce Energy Consumption in Machining****Technical Paper Publication. IMECE2018-87735****Arun Unnikrishnan, P.V.M. Rao, IIT Delhi, New Delhi, India****2-13 ROBOTICS & AUTOMATION IN ADVANCED MANUFACTURING****2-13-2 Manipulators and Interfaces****Third Floor, David L. Lawrence Convention Center, Room 302
1:45pm–3:30pm****Session Chair:** Daniel Cox, Georgia Southern University, Statesboro, GA, United States**Session Co-Chair:** Andrzej Nycz, Oak Ridge National Laboratory, Oak Ridge, TN, United States**1:45pm – Additive Manufacturing-Based Manipulator Design, Fabrication, and Testing****Technical Presentation. IMECE2018-89800****Mark W. Noakes, Bradley S. Richardson, Oak Ridge National Laboratory, Oak Ridge, TN, United States****2:06pm – VR-Mediated Teleoperation With Glove-Like Interfaces****Technical Paper Publication. IMECE2018-87085****Kun Chen, Prawesh Dahal, Mariam Avagyan, Kevin Huang, Trinity College, Hartford, CT, United States****2:27pm – Torch End-Effector and TIG Electrode Changeout Design for a TIG Welding Robot Used in Metal Big Area Additive Manufacturing****Technical Paper Publication. IMECE2018-86726****Christopher Masuo, Andrzej Nycz, Mark W. Noakes, Oak Ridge National Laboratory, Oak Ridge, TN, United States, Jared Bell, Justin Killian, Chandler Oakley, William Hamel, University of Tennessee, Knoxville, TN, United States****2:48pm – Welding Robotic Co-Worker Using Brain Computer Interface****Technical Paper Publication. IMECE2018-87503****Yao Li, University of Illinois at Urbana-Champaign, Urbana, IL, United States, T. Kesavadas, University of Illinois Urbana-Champaign, Mahomet, IL, United States****3:09pm – Intelligent Decision Making Approach for Performance Evaluation of a Robot-Based Manufacturing Cell****Technical Paper Publication. IMECE2018-86666****Tavo Kangru, Tallinn University of Technology, Tallinn, Estonia, Jüri Riives, Innovative Manufacturing Engineering Systems Competence Centre, Tallinn, Estonia, Tauno Otto, Meelis Pohlak, Kashif Mahmood, Tallinn University of Technology, Tallinn, Estonia****2-15 DIGITAL MANUFACTURING SIMULATION AND VALIDATION****2-15-2 Digital Manufacturing in Digital Twin Aspects****Third Floor, David L. Lawrence Convention Center, Room 303
1:45pm–3:30pm****Session Chair:** Germanico Gonzalez-Badillo, Universidad Autonoma De San Luis Potosi, Rioverde San Luis Potosi, Mexico**Session Co-Chairs:** Kai He, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China, David Guerra-Zubiaga, Kennesaw State University, Marietta, GA, United States**1:45pm – Demonstration of an Industrial Framework for an Implementation of a Process Digital Twin****Technical Paper Publication. IMECE2018-87361****J.M. Eyre, Advanced Manufacturing Research Centre, Sheffield, Yorkshire, United Kingdom, T.J. Dodd, University of Sheffield, Sheffield, United Kingdom, C. Freeman, R. Lanyon-Hogg, A.J. Lockwood, R.W. Scott, Advanced Manufacturing Research Centre, Sheffield, United Kingdom****2:06pm – Towards a Digital Twin for Cloud Manufacturing: Case Study****Technical Paper Publication. IMECE2018-87688****Diane Ngo, Kennesaw State University, Marietta, GA, United States, Reza Vatankhah-Barenji, Hacettepe University, Ankara, Turkey, Germanico Gonzalez-Badillo, Universidad Autonoma de San Luis Potosi, Rioverde San Luis Potosi, Mexico, David Guerra-Zubiaga, Kennesaw State University, Marietta, GA, United States****2:27pm – Virtual Experimental Investigation for Industrial Robotics in Gazebo Environment****Technical Paper Publication. IMECE2018-87686****Murat Aksu, Frederick Proctor, John Michaloski, The National Institute of Standards and Technology, Gaithersburg, MD, United States****2:48pm – A Digital Twin Concept for Manufacturing Systems****Technical Paper Publication. IMECE2018-87737****Wesley Ellgass, Kennesaw State University, Kennesaw, GA, United States, Ali Vatankhah-Barenji, Guangdong University of Technology, Guangzhou, China, Hector S. Lemus, Nathan Holt, Kennesaw State University, Kennesaw, GA, United States, Julian Richmond, Kennesaw State University, Marietta, GA, United States, Germanico Gonzalez-Badillo, Universidad Autonoma de San Luis Potosi, Rioverde Potosi, Mexico**

3:09pm – Digital Twin Using Siemens PLCs and PLM Software: A Manufacturing Material System Case Study
Technical Presentation. IMECE2018-87772

David Guerra-Zubiaga, Steven Moser, Michael Fyfe, Kennesaw State University, Marietta, GA, United States, Sebastien Desarzens, Donato Laurent, Fribourg University, Fribourg, Switzerland

2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

2-2-3 Congress-Wide Symposium on Additive Manufacturing: Metals – Powder Bed Fusion I

Third Floor, David L. Lawrence Convention Center, Room 301
3:45pm–5:09pm

Session Chair: Scott Thompson, Auburn University, Auburn, AL, United States

Session Co-Chair: Nima Shamsaei, Auburn University, Auburn, AL, United States

3:45pm – Utilizing Advanced Manufacturing Technologies to Develop a Reconfigurable Lumbar Puncture Training Model

Technical Paper Publication. IMECE2018-86851
Besim Kalajdzic, University of Windsor, Windsor, ON, Canada, Ruth Jill Urbanic, University of Windsor, La Salle, ON, Canada, Andre Khayat, Anna Farias, University of Windsor, Windsor, ON, Canada

4:06pm – Porosity Analysis in Metal Additive Manufacturing by Micro-CT

Technical Paper Publication. IMECE2018-87897
Subin Shrestha, Thomas Starr, Kevin Chou, University of Louisville, Louisville, KY, United States

4:27pm – Comparison of Louvered Plate-Fin Heat Exchangers Made via Additive Manufacturing

Technical Paper Publication. IMECE2018-87941
Michael Bichnevicius, David Saltzman, Stephen Lynch, Pennsylvania State University, University Park, PA, United States

4:48pm – Optimize Additive Manufacturing Post-Build Heat Treatment and Hot Iso-Static Pressing Process Using an Integrated Computational Materials Engineering Framework

Technical Paper Publication. IMECE2018-88550
Anahita Imanian, Kelvin Leung, Nagaraja Iyer, Technical Data Analysis, Falls Church, VA, United States, Derek H. Warner, Peipei Li, Cornell University, Ithaca, NY, United States

2-5 MANUFACTURING OF ATOMICALLY-THIN, TWO-DIMENSIONAL MATERIALS

2-5-3 Synthesis and Processing of 2D Materials

Third Floor, David L. Lawrence Convention Center, Room 304
3:45pm–5:30pm

Session Chair: Pilgyu Kang, George Mason University, Fairfax, VA, United States

Session Co-Chairs: SungWoo Nam, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Mike Cai Wang, University of South Florida, Tampa, FL, United States

3:45pm – Electrochemical Polishing of Large Area Two-Dimensional Materials Grown by Physical Vapor Transport
Technical Presentation. IMECE2018-89854

Amritanand Sebastian, Pennsylvania State University, University Park, PA, United States, Akhil Dodda, Pennsylvania State University, State College, PA, United States, Daniel Schulman, Pennsylvania State University, University Park, PA, United States, Saptarshi Das, Pennsylvania State University, State College, PA, United States

4:06pm – Strengthening and Toughening of Thin Metal Leaves by Graphene Synthesis

Technical Presentation. IMECE2018-89512
Kaihao Zhang, Sameh Tawfick, University of Illinois at Urbana Champaign, Urbana, IL, United States

4:27pm – Roll-to-Roll Plasma Chemical Vapor Deposition for Scalable Nanomanufacturing of Graphene

Technical Presentation. IMECE2018-86382
Majed Alrefae, Purdue University, West Lafayette, IN, United States, Timothy Fisher, University of California, Los Angeles, Los Angeles, CA, United States

4:48pm – Large-Scale Dynamic Energy Driven Assembly of Two-Dimensional Layered Materials on Polymer Substrate

Technical Presentation. IMECE2018-88881
Dong Zhou, Bo Li, Villanova University, Villanova, PA, United States

5:09pm – Analysis of Multilayered Copper/Nickel/Titanium Deposited Aluminum Alloys Using Electrochemical Process
Technical Presentation. IMECE2018-88889

Mohammad Asaduzzaman Chowdhury, Dhaka University of Engineering & Technology, Gazipur, Gazipur, Bangladesh, Bengir Ahmed Shuvho, Dhaka University of Engineering & Technology, Dhaka, Bangladesh, Uttam Kumar Debnath, Rajib Nandee, Dhaka University of Engineering & Technology, Gazipur, Gazipur, Gazipur, Bangladesh, Suman Das, University of Saskatchewan, Saskatchewan, SK, Canada, Mohi Uddin Ahmed, Dhaka University of Engineering & Technology, Gazipur, Bangladesh, Atiqur Rahman, Bangladesh Road Transport Authority, Dhaka, Bangladesh

2-13 ROBOTICS & AUTOMATION IN ADVANCED MANUFACTURING

2-13-3 Algorithms and Optimization

Third Floor, David L. Lawrence Convention Center, Room 302
3:45pm–5:30pm

Session Chair: Daniel Cox, *Georgia Southern University, Statesboro, GA, United States*

Session Co-Chair: Andrzej Nycz, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

3:45pm – Efficient Feedrate Optimization Method for Spline Toolpath With Curvature-Base Planning and Accurate Interpolating

Technical Paper Publication. IMECE2018-86162

Yong Zhang, Mingyong Zhao, Peiqing Ye, *Tsinghua, Beijing, China, Jiali Jiang, China University of Mining & Technology, Beijing, China, Hui Zhang, Tsinghua, Beijing, China*

4:06pm – Adaptive Industrial Robots Using Machine Vision

Technical Paper Publication. IMECE2018-86720

Vladimir Kuts, Tauno Otto, Toivo Tähemaa, Khuldoon Bukhari, Tengiz Pataraiia, *Tallinn University of Technology, Tallinn, Harju, Estonia*

4:27pm – A Collision-Free Motion Planning Approach for Parallel Manipulator Assembly Based on Machine Vision

Technical Presentation. IMECE2018-88784

Haodong Chen, *Hefei University of Technology, Hefei, China, Zheng Guo, Shanghai Jiao Tong University, Shanghai, China, Yifan Wang, Ping Zhao, Hefei University of Technology, Hefei, China*

4:48pm – Graphically Manipulating Procedurally Generated G-Code

Technical Presentation. IMECE2018-89740

Steven Patrick, *Oak Ridge National Laboratory, Knoxville, TN, United States, Andrzej Nycz, Mark W. Noakes, Oak Ridge National Laboratory, Oak Ridge, TN, United States*

5:09pm – Control of Continuous Polymer Compounding Fuse Filament Modeling

Technical Paper Publication. IMECE2018-87114

Connor Armstrong, Thomas Carlacci, David Bigio, *University of Maryland, College Park, MD, United States*

2-14 LASER-BASED ADVANCED MANUFACTURING AND MATERIALS PROCESSING

2-14-2 Laser-Matter Interaction and Its Applications in Materials Processing

Third Floor, David L. Lawrence Convention Center, Room 305
3:45pm–5:30pm

Session Chair: Leila Ladani, *University of Texas at Arlington, Arlington, TX, United States*

Session Co-Chair: Sriharsha Srinivas Sundarram, *Fairfield University, Fairfield, CT, United States*

3:45pm – Multi-Physics Modeling of Laser Interaction With Surface in Powder Bed Melting Process

Technical Paper Publication. IMECE2018-86566

Faiyaz Ahsan, *University of Texas at Arlington, Arlington, TX, United States, Jafar Razmi, University of Texas at Arlington, Fort Worth, TX, United States, Leila Ladani, University of Texas at Arlington, Arlington, TX, United States*

4:06pm – Laser Triggered Alloying of Al-Shell/Ni-Core Energetic Nanoparticle: A Molecular Dynamics Study

Technical Paper Publication. IMECE2018-86942

Pengfei Ji, Mengzhe He, Yiming Rong, *Southern University of Science and Technology, Shenzhen, Guangdong, China, Yuwen Zhang, University of Missouri, Columbia, MO, United States, Yong Tang, South China University of Technology, Guangzhou, Guangdong, China*

4:27pm – Simulation and Characterization of 3D Shape Optical Fiber Sensors Fabricated by Femtosecond Laser

Technical Presentation. IMECE2018-88130

Seunghwan Jo, Hang-Eun Joe, Anmol Guram, Martin Jun, *Purdue University, West Lafayette, IN, United States*

4:48pm – Laser Foaming of Polyetherimide (PEI)

Technical Paper Publication. IMECE2018-88623

Sriharsha Srinivas Sundarram, Venkateshwarlu Kakumanu, *Fairfield University, Fairfield, CT, United States*

5:09pm – Synthesis of Molybdenum-Doped TiO₂ by Laser Ablation in Precursor Solution

Technical Presentation. IMECE2018-89687

Mustafa Mozael, *Rutgers University, New Brunswick, NJ, United States, Stephen Tse, Bernard Kear, Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

2-15 DIGITAL MANUFACTURING SIMULATION AND VALIDATION

2-15-3 Digital Manufacturing in Industry 4.0 Aspects

Third Floor, David L. Lawrence Convention Center, Room 303
3:45pm–5:30pm

Session Chair: Kai He, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*

Session Co-Chairs: Germanico Gonzalez-Badillo, *Universidad Autonoma de San Luis Potosi, Rioverde San Luis Potosi, Mexico*, David Guerra-Zubiaga, *Kennesaw State University, Marietta, GA, United States*

3:45pm – Digital Factory: Simulation Enhancing Production and Engineering Process

Technical Paper Publication. IMECE2018-88334

Angella Thomas, John Cohran III, David Guerra-Zubiaga, *Kennesaw State University, Marietta, GA, United States*

4:06pm – A Novel Modeling Approach for Solving the Cell Formation Problem

Technical Paper Publication. IMECE2018-88128

Taras Dmytryshyn, Mohamed Ismail, *University of Regina, Regina, SK, Canada*, Ola Rashwan, *Pennsylvania State University, Middletown, PA, United States*

4:27pm – Research on the Integrated Optimization for Path Planning of Transfer Robots and Production Scheduling of Flexible Job Shops

Technical Presentation. IMECE2018-86759

Xixing Li, *Hubei University of Technology, Wuhan, Hubei, China*, Baigang Du, *Wuhan University of Technology, Wuhan, Hubei, China*

4:48pm – Internet of Things in Manufacturing: An Overview

Technical Paper Publication. IMECE2018-88262

Hussam Alothman, *Binghamton University, Johnston City, NY, United States*, Mohammad Khasawneh, Nagen Nagarur, *Binghamton University, Binghamton, NY, United States*

5:09pm – AI Based Monitoring and Control of Injection Molding Process for Consistent Product Quality

Technical Presentation. IMECE2018-89531

Hong Seok Park, Saurabh Kumar, *University of Ulsan, Ulsan, Korea (Republic)*

THURSDAY, NOVEMBER 15

2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

2-2-4 Congress-Wide Symposium on Additive Manufacturing: Metals – Powder Bed Fusion II

Third Floor, David L. Lawrence Convention Center, Room 301
8:55am–10:40am

Session Chair: Scott Thompson, *Auburn University, Auburn, AL, United States*

Session Co-Chairs: Nima Shamsaei, *Auburn University, Auburn, AL, United States*, Albert To, *University of Pittsburgh, Pittsburgh, PA, United States*

8:55am – Mitigating Near-Surface Porosity in a Laser Powder Bed Fusion Process

Invited Presentation. IMECE2018-89768

Sneha Prabha Narra, *Worcester Polytechnic Institute, Worcester, MA, United States*, Luke Scime, Jack Beuth, *Carnegie Mellon University, Pittsburgh, PA, United States*

9:37am – Efficient Optimization of Build Orientation and Support Structure Design for Laser Powder Bed Additive Manufacturing

Technical Presentation. IMECE2018-89493

Albert To, Lin Cheng, Qian Chen, Xuan Liang, *University of Pittsburgh, Pittsburgh, PA, United States*

9:58am – Microstructure Development After Thermal Cycling by Adjacent Melt Pools in Ti-B Alloys

Technical Presentation. IMECE2018-89786

Yining He, Jack Beuth, Bryan Webler, Nicholas Jones, *Carnegie Mellon University, Pittsburgh, PA, United States*

10:19am – Alloy Composition and Processing Changes to Mitigate Melt Pool Balling Defects in Direct Metal Additive Manufacturing

Technical Presentation. IMECE2018-89988

Jack Beuth, Debomita Basu, Zachary Francis, Nicholas Jones, Bryan Webler, *Carnegie Mellon University, Pittsburgh, PA, United States*

2-4 NANOMANUFACTURING

2-4-1 Nanomanufacturing: Spray or Print Deposition Techniques for Nanomaterials and Nanostructures

Third Floor, David L. Lawrence Convention Center, Room 304
8:55am–10:40am

Session Chair: Matt Maschmann, *University of Missouri, Columbia, MO, United States*

Session Co-Chair: Chih-Hao Chang, *North Carolina State University, Raleigh, NC, United States*

8:55am – Harnessing the Versatility of Carbon Nanotubes as Printed Thin Films

Technical Presentation. IMECE2018-86495

Aaron Franklin, *Duke University*

9:16am – Obtaining Thickness-Limited Electrospray Deposition for 3D Coating

Technical Presentation. IMECE2018-88299

Lin Lei, Rutgers University, Piscataway, NJ, United States, **Dylan Kovacevich**, Rutgers University, Belle Mead, NJ, United States, **Michael P. Nitzsche**, Rutgers University, Piscataway, NJ, United States, **Jihyun Ryu**, Drexel University, Piscataway, NJ, United States, **Kutaiba Al-Marzoki**, Rutgers University, Piscataway, NJ, United States, **Gabriela Rodriguez**, City University of New York, Bronx, NY, United States, **Lisa C. Klein**, Rutgers University, Piscataway, NJ, United States, **Andrei Jitianu**, City University of New York, Bronx, NY, United States, **Jonathan Singer**, Rutgers University, Piscataway, NJ, United States

9:37am – Geometric Effects on 3D Coating by Self-Limiting Electrospray

Technical Presentation. IMECE2018-89649

Dylan Kovacevich, Rutgers University, Belle Mead, NJ, United States, **Lin Lei**, **Jonathan Singer**, Rutgers University, Piscataway, NJ, United States

9:58am – Modeling Electrosprays: Millions of Charged Drops Evaporating, Fissioning, and Depositing on a Substrate

Technical Presentation. IMECE2018-89841

Marriner Merrill, US Naval Research Laboratory, Washington, DC, United States

2-6 ADVANCED MACHINING AND FINISHING

2-6-3 Assisted Machining Techniques

Third Floor, David L. Lawrence Convention Center, Room 305
8:55am–10:40am

Session Chair: Sathish Kannan, American University of Sharjah, Sharjah, United Arab Emir.

Session Co-Chair: Chang Ye, University of Akron, Peninsula, OH, United States

8:55am – A Numerical Study to Investigate the Influence of Edge Preparation in Vibration Assisted Machining

Technical Paper Publication. IMECE2018-87731

Salman Pervaiz, Rochester Institute of Technology – Dubai Campus, Dubai, United Arab Emir., **Sathish Kannan**, American University of Sharjah, Sharjah, United Arab Emir., **Wael Samad**, Rochester Institute of Technology - Dubai Campus, Dubai, United Arab Emir.

9:16am – Improving the Fretting and Corrosion Fatigue Strength of 300M Ultra-High Strength Steel Using the Ultrasonic Surface Rolling Process

Technical Presentation. IMECE2018-89765

Weidong Zhao, University of Akron, Akron, OH, United States, **Chang Ye**, University of Akron, Peninsula, OH, United States, **Daoxin Liu**, **Xiaohua Zhang**, Northwestern Polytechnical University, Xian, Shaanxi, China, **Ruixia Zhang**, **Hao Zhang**, University of Akron, Akron, OH, United States, **Ying Zhou**, INSA Rennes, Rennes, Bretagne, France

9:37am – Enhanced Plasticity for Metallic Glasses by Electropulsing-Assisted Surface Severe Plastic Deformation

Technical Presentation. IMECE2018-89780

Chi Ma, University of Akron, Akron, OH, United States, **Sergey Suslov**, Qatar Environment and Energy Research Institute, Doha, Qatar, **Chang Ye**, University of Akron, Peninsula, OH, United States, **Yalin Dong**, University of Akron, Akron, OH, United States

9:58am – The Effects of Electrically-Assisted Ultrasonic Nanocrystal Surface Modification on 3D-Printed Ti-6Al-4V Alloy

Technical Presentation. IMECE2018-89788

Hao Zhang, **Jingyi Zhao**, **Jun Liu**, **Haifeng Qin**, **Zhencheng Ren**, **Gary Doll**, University of Akron, Akron, OH, United States, **Yalin Dong**, University of Akron, Akron, OH, United States, **Chang Ye**, University of Akron, Peninsula, OH, United States

10:19am – Measuring Points Selection for Laser Tracker Measurement of Five-Axis Machine Tool

Technical Paper Publication. IMECE2018-88314

Qingzhao Li, **Wei Wang**, **Hai Li**, **Jing Zhang**, **Zhong Jiang**, University of Electronic Science and Technology of China, ChengDu, China

2-8 ADVANCED MATERIAL FORMING

2-8-1 Novel Processes

Third Floor, David L. Lawrence Convention Center, Room 302
8:55am–10:40am

Session Chair: William Emblom, University of Louisiana-Lafayette, Lafayette, LA, United States

Session Co-Chair: Ihab Ragai, Pennsylvania State University, Behrend College, Erie, PA, United States

8:55am – Friction Stir Back Extrusion: Preliminary Investigations on Through-Wall Characteristics for AL-1100-O

Technical Paper Publication. IMECE2018-86318

William Emblom, **Austin Menard**, **Clarissa Gallardo**, University of Louisiana at Lafayette, Lafayette, LA, United States, **Clayton Loehn**, Louisiana State University, Baton Rouge, LA, United States, **Ayotunde Olayinka**, University of Louisiana at Lafayette, Lafayette, LA, United States, **Scott Wagner**, Michigan Tech, Atlantic Mine, MI, United States, **Muhammad Wahab**, Louisiana State University, Baton Rouge, LA, United States, **Daniel Seguin**, Michigan Technological University, Houghton, MI, United States

9:16am – Effect of Process Parameters on the Electrically-Assisted Sintered Iron-Copper Powder Metals

Technical Paper Publication. IMECE2018-86891

Ihab Ragai, **Matt Schwabenbauer**, Pennsylvania State University, Behrend College, Erie, PA, United States, **Seray Eser**, **Michael Müller**, Rosenheim University of Applied Sciences, Rosenheim, Germany

9:37am – Mechanical Response and Grain Size Effects in Microscale Reverse Extrusion of Copper

Technical Presentation. IMECE2018-87996

Bin Zhang, Yooseob Song, George Voyiadjis, Wen Meng, Louisiana State University, Baton Rouge, LA, United States, **Kristian Juul, Kim L. Nielsen,** Technical University of Denmark, Kgs. Lyngby, Denmark

9:58am – Electroplasticity Behavior of Mg AZ31B Subjected To Electropulsing Assisted Tension

Technical Presentation. IMECE2018-89819

Chang Ye, University of Akron, Peninsula, OH, United States, **Zhencheng Ren, Jingyi Zhao, Jun Liu, Hao Zhang, Yalin Dong,** University of Akron, Akron, OH, United States

10:19am – A Numerical Study on Rotational Tube Flaring Process

Technical Paper Publication. IMECE2018-86918

Chetan Nikhare, Pennsylvania State University, Erie, PA, United States

2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING

2-11-1 Advanced Manufacturing Processes-Modeling and Simulation I

Third Floor, David L. Lawrence Convention Center, Room 303
8:55am–10:40am

Session Chair: Virginia DeGiorgi, Naval Research Laboratory, Washington, DC, United States

Session Co-Chair: Yucheng Liu, Mississippi State University, Mississippi State, MS, United States

8:55am – Prediction of Residual Stress and Damage in Thermal Spray Coatings Using Hybrid Computational Approach

Technical Paper Publication. IMECE2018-86504

Abba Abubakar, Abul Fazal M. Arif, Khaled Al-Athel, Syed Sohail Akhtar, King Fahad University of Petroleum & Minerals, Dhahran, Saudi Arabia

9:16am – Three-Dimensional Computational Modeling of Microstructure Defects in Thermal Barrier Coatings

Technical Presentation. IMECE2018-88983

Stephanie Wimmer, Virginia DeGiorgi, Naval Research Laboratory, Washington, DC, United States, **John Drazin,** ASEE, Washington, DC, United States, **Edward Gorzkowski,** Naval Research Laboratory, Washington, DC, United States

9:37am – Modeling and Experimental Verification of Torque and Thrust Forces Generated by the Conventional Drill's Chisel Edge

Technical Paper Publication. IMECE2018-86155

Charbel Seif, American University of Beirut, Beirut, Lebanon, **Ilige Hage,** Notre Dame University-Louaize, Zouk Mosbeh, Lebanon, **Ramsey Hamade,** American University of Beirut, Beirut, Riad El Solh, Lebanon

9:58am – Statistically Validated and Optimized Tabu Search Estimation of Cutting Tool Life in Turning

Technical Paper Publication. IMECE2018-86232

Remi Hage, Ilige Hage, Chady Ghnatios, Notre Dame University-Louaize, Zouk Mosbeh, Lebanon, **Ramsey Hamade,** American University of Beirut, Beirut, Riad El Solh, Lebanon

10:19am – Flexible Fiber Motion in Fiber-Reinforced Composite Material Processing

Technical Paper Publication. IMECE2018-86440

Diwei Zhang, Prairie View A&M University, Cypress, TX, United States, **Xiaobo Peng, Dongdong Zhang,** Prairie View A&M University, Prairie View, TX, United States

2-12 VARIATION SIMULATION AND DESIGN FOR ASSEMBLY

2-12-1 Variation Simulation and Design for Assembly I

Fourth Floor, David L. Lawrence Convention Center, Room 402
8:55am–10:40am

Session Chair: Kristina Wärmefjord, Chalmers University of Technology, Gothenburg, Sweden

Session Co-Chair: Hua Wang, Shanghai Jiao Tong University, Shanghai, China

8:55am – Geometry Assurance in a Digitally Connected Environment

Technical Presentation. IMECE2018-89239

Rikard Söderberg, Chalmers University of Technology, Gothenburg, Sweden

9:37am – Part Variation Simulations: An Industrial Case Study With an Experimental Validation

Technical Paper Publication. IMECE2018-87329

Narendra Akhadkar, Schneider Electric Industries SAS, Grenoble, France, **Silvestre Cano,** Schneider Electric, Apodaca, Mexico, **Alain Van Hoecke, Jean Marie Maldjian, Christophe Gourru,** Schneider Electric Industries SAS, Grenoble, France

9:58am – Convex Optimization Techniques as Applied to Simulation of Compliant Assembly

Technical Presentation. IMECE2018-88963

Maria Stefanova, Boris Grigoriev, Margarita Petukhova, Sergey Lupuleac, Stanislav Baklanov, Olga Minewitsch, Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia

10:19am – Tolerance Allocation With Simulation-Based Digital Twin for CFRP-Metal Countersunk Bolt Joint

Technical Paper Publication. IMECE2018-86645

Hua Wang, Mengqian Zhou, Shanghai Jiao Tong University, Shanghai, China, **Bo Liu,** Chongqing Changan Automobile Co., Ltd., Oushang Automobile Institute, Chongqing, China

2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

2-2-5 Congress-Wide Symposium on Additive Manufacturing: Polymers I

Third Floor, David L. Lawrence Convention Center, Room 301
10:50am–12:35pm

Session Chair: Mehran Tehrani, *University of New Mexico, Albuquerque, NM, United States*

Session Co-Chairs: Junghoon Yeom, *Michigan State University, East Lansing, MI, United States*, Heather Lai, *SUNY New Paltz, New Paltz, NY, United States*

10:50am – Direct and Converse Piezoelectric Behavior of Three-Dimensionally Printed Polymer Without Filler or Poling

Technical Presentation. IMECE2018-86014
Patatri Chakraborty, Chi Zhou, Deborah D.L. Chung, *University at Buffalo, State University of New York, Buffalo, NY, United States*

11:11am – In-Plane Molecular Alignment in 3D-Printed Polymers Due to Printing-Process-Induced Shear Stress

Technical Presentation. IMECE2018-86015
Patatri Chakraborty, Naga B. Gundrati, Chi Zhou, Chong Cheng, Deborah D.L. Chung, *University at Buffalo, State University of New York, Buffalo, NY, United States*

11:32am – Influence of the Weak Interfaces on the Fracture Toughness of 3D Printed Polymers

Technical Presentation. IMECE2018-86508
L. Roy Xu, Mehran Tehrani, *University of New Mexico, Albuquerque, NM, United States*

11:53am – Effect of Process Parameters on Compressive Properties of ULTEM 9085 Produced by FDM Process

Technical Paper Publication. IMECE2018-87523
Aboma Wagari Gebisa, Hirpa G. Lemu, *University of Stavanger, Stavanger, Rogaland, Norway*

12:14pm – Fully Resolved Simulations of Additive Manufacturing Processes

Technical Presentation. IMECE2018-87850
Gretar Tryggvason, Huanxiong Xia, Jiakai Lu, *Johns Hopkins University, Baltimore, MD, United States*

2-4 NANOMANUFACTURING

2-4-2 Nanomanufacturing: Nanomaterials Synthesis and Assembly

Third Floor, David L. Lawrence Convention Center, Room 304
10:50am–12:35pm

Session Chair: Dmitry Papkov, *University of Nebraska–Lincoln, Lincoln, NE, United States*

Session Co-Chair: Matt Maschmann, *University of Missouri, Columbia, MO, United States*

10:50am – Numerical Investigation of Internal Forces During Carbon Nanotube Forest Self-Assembly

Technical Paper Publication. IMECE2018-86567
Taher Hajilounezhad, Matt Maschmann, *University of Missouri-Columbia, Columbia, MO, United States*

11:11am – Stochastic Growth of Tall Carbon Nanotube Forest Using Rapid Thermal Chemical Vapor Deposition

Technical Presentation. IMECE2018-87644
Jaeyeun Lee, Moataz Abdulhafez, Mostafa Bedewy, *University of Pittsburgh, Pittsburgh, PA, United States*

11:32am – 3D Carbon Nanotube Microstructures From Multi-Stage Chemical Vapor Deposition

Technical Presentation. IMECE2018-87840
Ryan Hines, Matt Maschmann, *University of Missouri-Columbia, Columbia, MO, United States*, **Cole Love-Baker,** *University of South Carolina, Columbia, SC, United States*

11:53am – Focused Laser Dewetting of Gold Nanofilms and Laser Induced Localized Physical Vapor Deposition

Technical Presentation. IMECE2018-88208
Jonathan Singer, Tiaxing Ma, *Rutgers University, Piscataway, NJ, United States*

12:14pm – 3D Compatible Sacrificial Nanoimprint Lithography for Tuning the Wettability of Thermoplastic Materials

Technical Presentation. IMECE2018-89823
Molla Hasan, Jonathan Singer, Imrhan Khan Shahjahan, *Rutgers University, Piscataway, NJ, United States*

2-6 ADVANCED MACHINING AND FINISHING

2-6-4 Nontraditional Machining Processes

Third Floor, David L. Lawrence Convention Center, Room 305
10:50am–12:35pm

Session Chair: Guha Manogharan, *Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: Yang Guo, *Michigan State University, East Lansing, MI, United States*

10:50am – A Comparison of the Effects of Wire Electrical Discharge Machining Parameters on the Processing of Traditionally Manufactured and Additively Manufactured 316L Stainless Steel Specimens

Technical Paper Publication. IMECE2018-88014
Gregory Bicknell, *Pennsylvania State University, State College, PA, United States*, **Guha Prasanna Manogharan**, *Pennsylvania State University, Boardman, OH, United States*

11:11am – Experimental Study on Machining of Hybrid Composite Stacks Using Submerged Abrasive Waterjet Machining Process

Technical Paper Publication. IMECE2018-88179
Sagil James, Mayur Sunil Narkhede, *California State University Fullerton, Fullerton, CA, United States*

11:32am – Methodology for the Control of the Volume of Material Removal in the Plateau Honing Process

Technical Presentation. IMECE2018-88745
Milton Fabian Coba-Salcedo, *Universidad del Atlantico, Barranquilla, Colombia*, **Irene Buj-Corral, Joan Vivancos-Calvet**, *Universitat Politècnica de Catalunya, Barcelona, Spain*

11:53am – Estimation of Machine Vision Parameters of Surface Roughness and Wire Wear in Wire EDM of Al-8%Si3N4 Metal Matrix Composite Material Using Artificial Neural Network

Technical Presentation. IMECE2018-89478
Gurupavan H.R., Ravindra Holalu Venkatadas, Devegowda T.M., *P.E.S College of Engineering, Mandya, India*

12:14pm – Geometric Tolerances Evaluation in Hydrostatic Rotary Table

Technical Presentation. IMECE2018-88986
Jun Zha, Hangcheng Zhang, Yipeng Li, Yaolong Chen, *Xi'an Jiaotong University, Xi'an, China*

2-8 ADVANCED MATERIAL FORMING

2-8-2 Formability-I

Third Floor, David L. Lawrence Convention Center, Room 302
10:50am–12:35pm

Session Chair: Chetan Nikhare, *Pennsylvania State University, Erie, PA, United States*

Session Co-Chair: William Emblom, *University of Louisiana-Lafayette, Lafayette, LA, United States*

10:50am – Technology Development and Tool Concepts for High-Temperature Forming of Titanium

Technical Paper Publication. IMECE2018-86660
Frank Schieck, *Fraunhofer Institute for Machine Tools & Forming Tech IWU, Chemnitz, Germany*, **Dirk Landgrebe, Matthias Demmler, Andre Albert**, *Fraunhofer IWU, Chemnitz, Germany*, **Martin Weber**, *Fraunhofer IST, Braunschweig, Germany*

11:11am – The Effect of Local Force Control on Punch Forces During Panel Forming

Technical Paper Publication. IMECE2018-86030
William Emblom, *University of Louisiana-Lafayette, Lafayette, LA, United States*

11:32am – Tube Buckling: An Advantage to Tube Shaping

Technical Paper Publication. IMECE2018-86910
Chetan Nikhare, *Pennsylvania State University, Erie, PA, United States*

11:53am – Determination of Thermal Parameters of a Work-Roll in Warm Rolling Using Inverse Modeling

Technical Paper Publication. IMECE2018-86106
Vinod Yadav, *North Eastern Regional Institute of Science & Technology, Nirjuli, Arunachal Pradesh, India*

12:14pm – Effect of Pre-Bending on Formability of DQ Steel and Al 5182

Technical Paper Publication. IMECE2018-87321
Shabbir Memon, Hamid Lankarani, Obaidur Rahman Mohammed, *Wichita State University, Wichita, KS, United States*

2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING

2-11-2 Advanced Manufacturing Processes-Modeling and Simulation II

Third Floor, David L. Lawrence Convention Center, Room 303
10:50am–12:35pm

Session Chair: Muhammad Jahan, *Miami University, Oxford, OH, United States*

Session Co-Chair: Yucheng Liu, *Mississippi State University, Mississippi State, MS, United States*

10:50am – Finite Element Simulation of Backward Micro Extrusion for Annealed Copper

Technical Paper Publication. IMECE2018-86755
Md. Mosleh Uddin, Debabrata Mondal, Paul D. Herrington, *University of New Orleans, New Orleans, LA, United States*

11:11am – Effect of Size Distribution on Optical Absorption During Intense Pulsed Light Sintering of Metal Nanoparticles

Technical Paper Publication. IMECE2018-87038
Harish Devaraj, Hyun-Jun Hwang, Rajiv Malhotra, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

11:32am – Numerical Modeling of a Pure Water Jet Machining of Ti-6Al-4V and Al 6061-T6 Using ABAQUS and Smoothed Particle Hydrodynamics

Technical Paper Publication. IMECE2018-87271
Greg Pasken, Jianfeng Ma, Mark McQuilling, *Saint Louis University, Saint Louis, MO, United States*, **Muhammad Jahan,** *Miami University, Oxford, OH, United States*

11:53am – FEM Investigation of Phase Transformation in Vibration Assisted Nano Impact Machining by Loose Abrasives (VANILA)

Technical Paper Publication. IMECE2018-87274
Nick Duong, Jianfeng Ma, *Saint Louis University, Saint Louis, MO, United States*, **Muhammad Jahan,** *Miami University, Oxford, OH, United States*, **Shuting Lei,** *Kansas State University, Manhattan, KS, United States*, **Murali Sundaram,** *University of Cincinnati, Cincinnati, OH, United States*

12:14pm – Cohesive Zone Modeling for Transfer Printing of Thin Films

Technical Presentation. IMECE2018-89426
Shruti Jain, Roger Bonnezaze, Kenneth Liechti, *University of Texas at Austin, Austin, TX, United States*

2-12 VARIATION SIMULATION AND DESIGN FOR ASSEMBLY

2-12-2 Variation Simulation and Design for Assembly II

Fourth Floor, David L. Lawrence Convention Center, Room 402
10:50am–12:35pm

Session Chair: Hua Wang, *Shanghai Jiao Tong University, Shanghai, China*

Session Co-Chair: Kristina Wärmefjord, *Chalmers University of Technology, Gothenburg, Sweden*

10:50am – Efficient Variation Simulation of Spot-Welded Assemblies

Technical Paper Publication. IMECE2018-87454
Samuel Lorin, *Fraunhofer Chalmers Centre, Gothenburg, Sweden*, **Björn Lindau, Roham Sadeghi Tabar, Lars Lindkvist, Kristina Wärmefjord, Rikard Söderberg,** *Chalmers University of Technology, Gothenburg, Sweden*

11:11am – Simulation and Optimization of Airframe Assembly Process

Technical Paper Publication. IMECE2018-87058
Sergey Lupuleac, Nadezhda Zaitseva, Maria Stefanova, Sergey Berezin, Julia Shinder, Margarita Petukhova, *Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia*, **Elodie Bonhomme,** *Airbus SAS, Toulouse, France*

11:32am – Influence of Selective Laser Heat Treatment Pattern Position on Geometrical Variation

Technical Paper Publication. IMECE2018-86164
Vaishak Ramesh Sagar, Kristina Wärmefjord, Rikard Söderberg, *Chalmers University of Technology, Gothenburg, Vastra Gotland, Sweden*

11:53am – CAD-Based Tolerance Analysis in Preliminary Design Stages Enabling Early Tolerance Evaluation

Technical Paper Publication. IMECE2018-86396
Stefan Goetz, Benjamin Schleich, Sandro Wartzack, *Friedrich-Alexander-University Erlangen-Nürnberg, Erlangen, Germany*

12:14pm – Compliant Variation Analysis for High-Speed Train With Consideration of Welding Distortion

Technical Paper Publication. IMECE2018-86619
Tao Liu, *Shanghai Jiao Tong University, Shanghai, China*, **Yongjun Li, Baowang Li,** *CRRC Tangshan Co., Ltd., Tangshan, China*, **Zhimin Li, Limin Yao, Sun Jin,** *Shanghai Jiao Tong University, Shanghai, China*

2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

2-2-6 Congress-Wide Symposium on Additive Manufacturing: Polymers II

Third Floor, David L. Lawrence Convention Center, Room 301
2:05pm–3:50pm

Session Chair: Mehran Tehrani, *University of New Mexico, Albuquerque, NM, United States*

Session Co-Chair: Deborah D.L. Chung, *University at Buffalo, State University of New York, Buffalo, NY, United States*

2:05pm – Optimization of Design Process of Fused Filament Fabrication (FFF) 3D Printing

Technical Paper Publication. IMECE2018-87916
Jaeyoon Kim, Bruce Kang, *West Virginia University, Morgantown, WV, United States*

2:26pm – Mechanical Behavior of Octahedral and Octet Structures Produced From CLIP Technology

Technical Paper Publication. IMECE2018-88192
Anil Saigal, *Tufts University, Medford, MA, United States,*
Gian Calise, *Tufts University, Cranston, RI, United States*

2:47pm – Flexible Strain Sensor Using Additive Manufacturing and Conductive Liquid Metal: Design, Fabrication, and Characterization

Technical Paper Publication. IMECE2018-88753
Austin Smith, Hamzeh Bardaweel, *Louisiana Tech University, Ruston, LA, United States*

3:08pm – Novel Ink for Ambient Condition Printing of Liquid Crystal Elastomers for 4D Printing

Technical Presentation. IMECE2018-88768
Devin Roach, Devin J. Roach, H. Jerry Qi, Craig Hamel, *Georgia Institute of Technology, Atlanta, GA, United States*

3:29pm – Rapid Multi-Material 3D Printing With Projection Micro-Stereolithography Using an Enclosed Printing Chamber and a Pump

Technical Presentation. IMECE2018-89396
Daehoon Han, Howon Lee, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

2-4 NANOMANUFACTURING

2-4-3 Nanomanufacturing: Integration of Nanoscale Materials or Textures for Enhanced Performance

Third Floor, David L. Lawrence Convention Center, Room 304
2:05pm–3:50pm

Session Chair: Chih-Hao Chang, *North Carolina State University, Raleigh, NC, United States*

Session Co-Chair: Dimitry Papkov, *University of Nebraska–Lincoln, Lincoln, NE, United States*

2:05pm – Advanced Nanomanufacturing and Hard-Soft Materials Integration for Smart and Connected Bioelectronics

Technical Presentation. IMECE2018-86294
Woon-Hong Yeo, Yun-Soung Kim, *Georgia Institute of Technology, Atlanta, GA, United States*

2:26pm – Regenerated Silk Fibroin Films With Reduced-Sheet Content by Microwave Processing and Carbon Nanotube Incorporation

Technical Presentation. IMECE2018-87653
Se Youn Cho, Moataz Abdulhafez, Mostafa Bedewy, *University of Pittsburgh, Pittsburgh, PA, United States*

2:47pm – Systematic Analysis of Pattern Precision and Uniformity in Roll-to-Roll Colloidal Assembly System

Technical Presentation. IMECE2018-86895
I-Te Chen, Elizabeth Schappell, Xiaolong Zhang, Chih-Hao Chang, *North Carolina State University, Raleigh, NC, United States*

3:08pm – Modification of Structure and Mechanical Behavior of Continuous Nanofibers Through Addition of Small Amounts of Nano-inclusions

Technical Presentation. IMECE2018-89822
Dimitry Papkov, Mohammad N. Andalib, Yuris Dzenis, *University of Nebraska - Lincoln, Lincoln, NE, United States*

2-6 ADVANCED MACHINING AND FINISHING

2-6-5 Machinability of Engineering Materials

Third Floor, David L. Lawrence Convention Center, Room 305
2:05pm–3:50pm

Session Chair: Sathish Kannan, *American University of Sharjah, Sharjah, United Arab Emir.*

Session Co-Chair: Derek Yip-Hoi, *Western Washington University, Bellingham, WA, United States*

2:05pm – Effect of Rake Angle and Feed Rate on the Surface Quality While Turning In Situ TiB₂/7050 Al Metal Matrix Composites

Technical Paper Publication. IMECE2018-87399
Kunyang Lin, Wenhui Wang, Ruisong Jiang, Yifeng Xiong, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*

2:26pm – An Experimental Investigation of Inclined Hole Drilling for CFRP Under Various Lubrication Techniques
Technical Paper Publication. IMECE2018-87550

Sathish Kannan, *American University of Sharjah, Sharjah, United Arab Emir.*, **Salman Pervaiz**, **Abhishek Ghoshal**, *Rochester Institute of Technology - Dubai Campus, Dubai, Dubai, United Arab Emir.*

2:47pm – Investigation and Modeling of Flag Generation in Honeycomb Sandwich Panel Machining

Technical Paper Publication. IMECE2018-87706

Derek Yip-Hoi, **David Gill**, *Western Washington University, Bellingham, WA, United States*

3:08pm – Delamination Area Prediction During Milling Carbon Fiber Reinforced Polymer Composites Based on Fiber Cutting Process Geometry Simulation Software

Technical Presentation. IMECE2018-87851

Xingyu Fu, **Kyeongun Song**, *Purdue University, West Lafayette, IN, United States*, **Gyuhoo Kim**, **Byung-Kwon Min**, *Yonsei University, Seoul, Korea (Republic)*, **Martin Jun**, *Purdue University, West Lafayette, IN, United States*

3:29pm – Comparative Assessment of Delamination Control Techniques in Machining of CFRP

Technical Presentation. IMECE2018-88901

Kamlesh Phapale, *Bharat Forge Ltd., Pune, Maharashtra, India*

2-7 THIRD SYMPOSIUM ON FASTENING AND JOINING TECHNOLOGY

2-7-2 Welding Performance Evaluation and Simulation

Fourth Floor, David L. Lawrence Convention Center, Room 401
2:05pm–3:50pm

Session Chair: Thomas Whitney, *University of Dayton, Dayton, OH, United States*

Session Co-Chair: Sayed Nassar, *Oakland University, Rochester, MI, United States*

2:05pm – Numerical Investigation on the Effect of Pintool Rotational Speed on the Coulomb and the Modified Coulomb Friction Model of Friction-Stir-Welding (FSW)

Technical Presentation. IMECE2018-86673

Saad Aziz, *Louisiana State University, Baton Rouge, LA, United States*, **Washim Dewan**, *DUET, Gazipur, Dhaka, Bangladesh*, **Daniel Huggett**, *Louisiana State University, Ponchatoula, LA, United States*, **Muhammad Wahab**, **Ayman Okeil**, **Warren Liao**, *Louisiana State University, Baton Rouge, LA, United States*

2:26pm – Improvement of Joint Integrity in MIG Welded Steel: A Review

Technical Paper Publication. IMECE2018-86788

Timothy Odiaka, **Nkosinathi Madushele**, **Stephen Akinlabi**, *University of Johannesburg, Johannesburg, Gauteng, South Africa*

2:47pm – Estimation and Comparison of Welding Performances Using MRA and GMDH in P-GMAW for SS 316L Material

Technical Paper Publication. IMECE2018-88604

Rudreshi Addamani, **Ravindra Holalu Venkatadas**, *P E S College of Engineering, Mandya, Karnataka, India*, **Ugrasen Gonchikar**, *BMSC College of Engineering, Bangalore, Karnataka, India*, **Chethan Y.D.**, *M I T Mysuru, Karnataka, Mandya, India*

3:08pm – Mathematical Model to Predict Tensile Strength of Underwater Friction Stir Welded (UFSW) on 5052 Aluminium Alloys

Technical Paper Publication. IMECE2018-88610

Srinivasa Rao Pedapati, *Universiti Teknologi Petronas, Perak Darul Ridzuan, Perak, Malaysia*, **Dhanis Paramaguru**, **Mokhtar Awang**, **Hamed Mohebbi**, *Universiti Teknologi Petronas, Seri Iskandar, Perak, Malaysia*

3:29pm – Improving the Heat Dissipation From a Pressure Wheel of a Laser Robotic End-of-Arm Tooling Using Different Geometrical Designs and Materials

Technical Paper Publication. IMECE2018-86880

Abdallah Hamieh, *Lawrence Technological University, Southfield, MI, United States*, **Badih Jawad**, *Lawrence Technological University, Dearborn Heights, MI, United States*, **Liping Liu**, **Vernon Fernandez**, *Lawrence Technological University, Southfield, MI, United States*, **Mike Kheirallah**, *Advanced Safety and Energy, Flint, MI, United States*

2-8 ADVANCED MATERIAL FORMING

2-8-3 Formability – II

Third Floor, David L. Lawrence Convention Center, Room 302
2:05pm–3:50pm

Session Chair: Chetan Nikhare, *Pennsylvania State University, Erie, PA, United States*

Session Co-Chair: Scott Wagner, *Michigan Tech, Atlantic Mine, MI, United States*

2:05pm – A New Incremental Bending System to Form Curved Metal Plate by Experiment and Finite Element Simulation

Technical Paper Publication. IMECE2018-86800

Xiaobing Dang, *Chinese University of Hong Kong, Hong Kong, Hong Kong*, **Kai He**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*, **Feifei Zhang**, *Shenzhen Institutes of Advanced Technology, Shenzhen, P.R.China, China*, **Qiyang Zuo**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*, **Ruxu Du**, *Chinese University of Hong Kong, Hong Kong, Hong Kong*

2:26pm – Utilization of Wavy Toolpath in Single-Point Incremental Forming

Technical Paper Publication. IMECE2018-86885

Tyler Grimm, **Ihab Ragai**, **John Roth**, *Pennsylvania State University, Behrend College, Erie, PA, United States*

2:47pm – Development of Processing Map for Superplastic Deformation of Ti-6Al-4V Alloy

Technical Paper Publication. IMECE2018-88631
Abdul Wahed Mohd, Amit Kumar Gupta, Nitin Kotkunde,
BITS Pilani Hyderabad Campus, Hyderabad, Telangana, India,
Swadesh Kumar Singh, GRIET, Hyderabad, India

3:08pm – Effect of Preform During Low Pressure Tube Hydroforming

Technical Paper Publication. IMECE2018-86090
Ashley Trott, Chetan Nikhare, Pennsylvania State University,
Erie, PA, United States

2-9 INNOVATIVE PRODUCT DESIGN

2-9-1 Innovative Product Design I

Fourth Floor, David L. Lawrence Convention Center, Room 402
2:05pm–3:50pm

Session Chair: Ricardo Jardim-Goncalves, Universidade Nova de Lisboa, Caparica, Portugal

Session Co-Chair: Siddharthsinh Jadeja, Aditya Silver Oak Institute of Technology, Rajkot Gujarat, India

2:05pm – The Design and Study of the Tensioned Whole Coupling

Technical Paper Publication. IMECE2018-86458
Yaohui Li, A’ni Luo, Heping Liu, Harbin Engineering University, Harbin, China

2:26pm – Improve Enterprise Resources Management Through the Usage of IoT in the Shopfloor

Technical Paper Publication. IMECE2018-87589
Adriana Cunha, TecMinho/University of Minho, Guimarães, Portugal, Joao Silva, Universidade do Minho, Guimaraes, Portugal

2:47pm – Design of Damped Structures to Increase Machine Tool Dynamical Performance

Technical Paper Publication. IMECE2018-87912
Francesco Aggogeri, Nicola Pellegrini, University of Brescia, Brescia, Lombardia, Italy, Angelo Merlo, CeSI, Cologno Monzese (MI), Italy, Alberto Borboni, Riccardo Adamini, Claudio Taesi, University of Brescia, Brescia, Lombardia, Italy

3:08pm – A Future Trend in Sensing Enterprise Systems

Technical Paper Publication. IMECE2018-88530
Majid Zamiri, Andreia Artifice, Elsa Marcelino-Jesus, Joao Sarraipa, Ricardo Jardim-Goncalves, Universidade Nova De Lisboa, Caparica, Portugal

3:29pm – Improve Product Profitability While Accelerating Time to Market

Technical Presentation. IMECE2018-88732
Stephanie Feraday, aPriori, Concord, MA, United States

2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING

2-11-3 Advanced Manufacturing Processes-Modeling and Simulation III

Third Floor, David L. Lawrence Convention Center, Room 303
2:05pm–3:50pm

Session Chair: Jose Teixeira, University of Minho, Guimaraes, Portugal

Session Co-Chair: Yucheng Liu, Mississippi State University, Mississippi State, MS, United States

2:05pm – A Study on Evolution of Splat Radius and Temperature in Thermal Spray Process

Technical Paper Publication. IMECE2018-87303
Manpreet Dash, Sangharsh Kumar, Partha P. Bandyopadhyay, Anandaroop Bhattacharya, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India

2:26pm – A Numerical Study of Solder Paste Rolling Process for PCB Printing

Technical Paper Publication. IMECE2018-88035
Ricardo Oliveira, Nelson Rodrigues, Jose Teixeira, University of Minho, Guimaraes, Portugal, Duarte Santos, Bosch Car Multimedia SA, Braga, Portugal, Delfim Soares, University of Minho, Guimaraes, Portugal, Maria Cerqueira, Physics Department, Braga, Portugal, Senhorinha Teixeira, University of Minho, Guimaraes, Portugal

2:47pm – Numerical and Experimental Characterization of Kerf Formation in Abrasive Waterjet Machining

Technical Paper Publication. IMECE2018-88617
Joseck Nyaporo Nyaboro, Egypt-Japan University of Science and Technology, New Borg Al Arab, Egypt, Mahmoud Ahmed, Assiut University, Assiut, Egypt, Hassan El-Hofy, Egypt-Japan University of Science and Technology, New Borg Al Arab, Egypt, Mohamed El-Hofy, Advanced Manufacturing Research Centre with Boeing, University of Sheffield, Willis Way, Rotherm, United Kingdom

3:08pm – Multiphysics Modeling and Parametric Analysis of an Inductor for Heating Thin Sheet Materials

Technical Paper Publication. IMECE2018-88676
Alex Mazursky, Miami University, Oxford, OH, United States, Hee-Chang Park, Sung-Hyuk Song, Korea Institute of Machinery and Materials, Daejeon, Korea (Republic), Jeong-Hoi Koo, Miami University, Oxford, OH, United States

3:29pm – Backpropagation Artificial Neural Network Method for the Prediction of Nanostructured Waspaloy Under Cryogenic and Hot Deformation

Technical Presentation. IMECE2018-88918
Harrison Onovo, David Esezobor, Muideen Bodude, Adeyanju Sosimi, University of Lagos, Lagos, Nigeria

2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

2-2-7 Congress-Wide Symposium on Additive Manufacturing: Composites/Ceramics & Bio-Applications

Third Floor, David L. Lawrence Convention Center, Room 301
4:00pm–5:45pm

Session Chair: Mehran Tehrani, *University of New Mexico, Albuquerque, NM, United States*

Session Co-Chairs: Gretar Tryggvason, *Johns Hopkins University, Baltimore, MD, United States*, Scott Thompson, *Auburn University, Auburn, AL, United States*

4:00pm – Dynamic Behavior of Biologically Inspired 3D Printed Visco-Elastic Heterogeneous Structures

Technical Paper Publication. IMECE2018-87845
Heather Lai, Jennifer Beahan, SUNY New Paltz, New Paltz, NY, United States

4:21pm – Additively Manufactured, Design Optimized Composites for Lightweighting

Technical Presentation. IMECE2018-88037
Nekoda Van De Werken, Pouria Khanbolouki, University of New Mexico, Albuquerque, NM, United States, Chitrang Patel, Ali Tamijani, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States, Mehran Tehrani, University of New Mexico, Albuquerque, NM, United States

4:42pm – Direct Ink Writing of Graphene Oxide Reinforced PDMS Matrix Composites for Improved Mechanical Properties

Technical Paper Publication. IMECE2018-88052
Chao Liu, Junjun Ding, Alfred University, Alfred, NY, United States, Li Jiang, Tuskegee University, Tuskegee, AL, United States

5:03pm – Conformal 3D Printing of Tire Tread Using Ground Tire Rubber (GTR) Composites

Technical Presentation. IMECE2018-89615
Faez Alkadi, Jae-Won Choi, University of Akron, Akron, OH, United States

5:24pm – Optimizing Process Parameters to Binder Jet Ceramics

Technical Presentation. IMECE2018-89844
Edgar Mendoza, Daming Ding, B. Reeja-Jayan, Jack Beuth, Carnegie Mellon University, Pittsburgh, PA, United States

2-6 ADVANCED MACHINING AND FINISHING

2-6-6 Cutting Tool Performance and Treatment

Third Floor, David L. Lawrence Convention Center, Room 305
4:00pm–5:24pm

Session Chair: Muhammad Jahan, *Miami University, Oxford, OH, United States*

Session Co-Chair: Ihab Ragai, *Pennsylvania State University, Behrend College, Erie, PA, United States*

4:00pm – Studies on Cryogenic Treated Drills Under Nano-Fluid Based Reduced Quantity Lubrication Conditions for Machining Ti6Al4V

Technical Paper Publication. IMECE2018-86941
D. Samuel Raj, Aarthi Kumaran, Jerome Arul Praveen.C, Anna University, Chennai, Tamil Nadu, India

4:21pm – Acoustic Signal Analysis for Prediction of Flank Wear During Conventional Milling

Technical Paper Publication. IMECE2018-86886
Travis Roney, Anthony Baucio, Derek Shaffer, Paige Lorson, Ihab Ragai, David Loker, Pennsylvania State University, Behrend College, Erie, PA, United States, Chetan Nikhare, Pennsylvania State University, Erie, PA, United States

4:42pm – Investigating the Effect of Tool Coating on Cutting Forces and Tool Wear During Micro-Milling of Polycarbonate Glass

Technical Paper Publication. IMECE2018-87441
Craig Hanson, Miami University, Oxford, OH, United States, Xingbang Chen, Saint Louis University, St. Louis, MO, United States, Muhammad Jahan, Miami University, Oxford, OH, United States, Jianfeng Ma, Saint Louis University, St. Louis, MO, United States, Gregory K. Arbuckle, Western Kentucky University, Bowling Green, KY, United States

5:03pm – Experimental and Theoretical Investigations on Tool Wear and Surface Quality in Micro Milling of SiCp/Al Composites Under Dry and MQL Conditions

Technical Paper Publication. IMECE2018-86071
Ben Deng, Hao Wei Wang, Fang Yu Peng, Rong Yan, Lin Zhou, Huazhong University of Science and Technology, Wuhan, China

2-7 THIRD SYMPOSIUM ON FASTENING AND JOINING TECHNOLOGY

2-7-1 Bonded Joint and Bolted Joint Technologies

Third Floor, David L. Lawrence Convention Center, Room 304
4:00pm–5:45pm

Session Chair: Sayed Nassar, *Oakland University, Rochester, MI, United States*

Session Co-Chair: Thomas Whitney, *University of Dayton, Dayton, OH, United States*

4:00pm – The Effect of Temperature, Thickness, and Working Time on Adhesive Properties

Technical Paper Publication. IMECE2018-86737

Nick Aerne, John P. Parmigiani, *Oregon State University, Corvallis, OR, United States*

4:21pm – Finite Element Analysis of the Load Factor and Design for Bolted T-Shape Flange Joints Consisting of Dissimilar Clamped Parts

Technical Paper Publication. IMECE2018-87335

Shunichiro Sawa, *Hardlock Industry Co., Ltd., Tokyo, Japan*,
Yasuhisa Sekiguchi, *Hiroshima University, Hiroshima, Japan*,
Toshiyuki Sawa, *Hiroshima University, Koto-City, Japan*

4:42pm – Use of Tailored Fiber Placement (TFP) to Reinforce Fastener Holes in Composites

Technical Presentation. IMECE2018-87999

Thomas Whitney, Gyaneshwar Tandon, *University of Dayton, Dayton, OH, United States*

5:03pm – Frequency Effect of Torsion on Rotating Bending Fatigue Behavior of Gas Tungsten Arc (GTA) Welded AISI 1018 and AISI 4140 Welded Joints

Technical Paper Publication. IMECE2018-88338

Saad Aziz, Ahmet Eren, Muhammad Wahab, *Louisiana State University, Baton Rouge, LA, United States*

2-8 ADVANCED MATERIAL FORMING

2-8-4 Testing and Defects

Third Floor, David L. Lawrence Convention Center, Room 302
4:00pm–5:45pm

Session Chair: Scott Wagner, *Michigan Tech, Atlantic Mine, MI, United States*

Session Co-Chair: Molla Hasan, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

4:00pm – High-Throughput Fabrication and Testing of Metallic Glass Nanostructures

Technical Presentation. IMECE2018-89835

Molla Hasan, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Golden Kumar,** *Texas Tech University, Lubbock, TX, United States*

4:21pm – Novel Approach for Tension Testing Micro Tubes

Technical Paper Publication. IMECE2018-87244

Scott Wagner, *Michigan Tech, Atlantic Mine, MI, United States*, **William Emblom,** *University of Louisiana-Lafayette, Lafayette, LA, United States*, **Kevin M. Johnson,** **Kahaan P. Shah,** **Navrose Handa,** **Nihal Kapare,** *Michigan Technological University, Houghton, MI, United States*

4:42pm – Experimental Analysis and Testing of the Hemming Process Types Utilized in the Automotive Industry

Technical Paper Publication. IMECE2018-87232

Pablo Alberto Limon Leyva, **Pedro De Jesus Garcia Zugasti,** **Eder Hazael Govea Valladares,** *Instituto Tecnológico de San Luis Potosi, San Luis Potosi, Mexico*, **Antonio de Jesus Balvantin Garcia,** *University of Guanajuato, Salamanca, Guanajuato, Mexico*, **Jose Angel Diosdado De La Pena,** *Universidad De Guanajuato, Salamanca, Mexico*, **Isidro de Jesus Sanchez Arce,** *Instituto Tecnológico de San Luis Potosi, San Luis Potosi, Mexico*

5:03pm – Springback Analysis in Hybrid Material Deformation

Technical Paper Publication. IMECE2018-86455

Elizabeth Mamros, *Pennsylvania State University, Behrend College, McMurray, PA, United States*, **Chetan Nikhare,** *Pennsylvania State University, Erie, PA, United States*

5:24pm – Simulation and Experiment Research on Squeeze Casting Combined With Forging of Automobile Control Arm

Technical Paper Publication. IMECE2018-86006

Liang Zhenglong, Zhang Qi, *Xi'an Jiaotong University, Xi'an, China*

2-9 INNOVATIVE PRODUCT DESIGN

2-9-2 Innovative Product Design II

Fourth Floor, David L. Lawrence Convention Center, Room 401
4:00pm–5:45pm

Session Chair: Joao Silva, *Universidade do Minho, Guimaraes, Portugal*

Session Co-Chair: Joao Sarraipa, *UNINOVA - DEE/FCT/UNL, Caparica, Portugal*

4:00pm – A Mathematical Functional Decomposition Approach Through Granularity Partition Process in Quotient Space

Technical Paper Publication. IMECE2018-86217

Yu-Tong Li, *China University of Petroleum, Qingdao, China*, **Yuxin Wang,** *China University of Petroleum, Huadong, Qingdao, Shandong, China*

4:21pm – Visualization and Detection of Road Traffic Events Using Complex Event Processing

Technical Paper Publication. IMECE2018-87909

Paulo Figueiras, Hugo Antunes, Guilherme Guerreiro, Ruben Costa, Ricardo Jardim-Goncalves, *Universidade Nova De Lisboa, Caparica, Portugal*

4:42pm – Monitoring, Risk Assessment and Actuation for Alzheimer Patients: A Case Study

Technical Paper Publication. IMECE2018-88166
 Fernando Luis-Ferreira, Joao Gao, Pedro Corista, Jorge Calado, Joao Sarraipa, *UNINOVA, Caparica, Portugal*

5:03pm – 3D Printing of Highly Thermal Insulated Thermosets

Technical Presentation. IMECE2018-89539
 Biran Wang, Kristen Arias, Zimeng Zhang, Zhijian Pei, Shiren Wang, *Texas A&M University, College Station, TX, United States*

5:24pm – Effects of Environmental Conditions on Geometrical and Mechanical Properties of Polycarbonate Samples Made by the Fused Filament Fabrication Process

Technical Presentation. IMECE2018-89328
 Yishu Yan, Lichen Fang, Ojaswi Agarwal, Kevin Hemker, Sung Kang, *Johns Hopkins University, Baltimore, MD, United States*

2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING

2-11-4 Advanced Manufacturing Processes-Modeling and Simulation V

Third Floor, David L. Lawrence Convention Center, Room 303
 4:00pm–5:45pm

Session Chair: Tien-Chien Jen, *University of Johannesburg, Johannesburg, South Africa*

Session Co-Chair: Yucheng Liu, *Mississippi State University, Mississippi State, MS, United States*

4:00pm – Randoms Subspace Identification in Modal Analysis of Port Crane

Technical Presentation. IMECE2018-86993
 Xiuzhong Xu, *Shanghai Maritime University, Shanghai, Shanghai, China*, Weidong Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*, Xu Zhang, *Shanghai Maritime University, Shanghai, China*

4:21pm – Feasibility Study of Condition Monitoring for Some Event Around the Crosshead in a Reciprocating Compressor

Technical Paper Publication. IMECE2018-87153
 Yoshifumi Mori, *Tokuyama Corporation, Yamaguchi, Japan*, Takashi Saito, Yu Mizobe, *Yamaguchi University, Ube City/ Yamaguchi, Japan*

4:42pm – The Mechanistic Process Comparison Between a Novel Slotted Injection Manifold Versus the Multiple Injection Manifold of a Low Pressure Square Type Atomic Layer Deposition Reactor

Technical Paper Publication. IMECE2018-86401
 Rigardt A.M. Coetzee, Tien-Chien Jen, *University of Johannesburg, Johannesburg, South Africa*

5:03pm – Generation Mechanism of Interfacial Residual Stress and its Effect on Mechanical Properties of Hybrid Fiber-Reinforced Thermoplastic Polymer (HFRTP)

Technical Paper Publication. IMECE2018-86523
 Wan Cao, Ning Kang, Lingyu Sun, Shanshu Xiang, Xudong Yang, Yiben Zhang, *Beihang University, Beijing, China*

5:24pm – Analysis of Tool Position Error Induced Surface Topography Changes in Five-Axis Flank Milling

Technical Paper Publication. IMECE2018-86898
 Hao Si, Liping Wang, *Tsinghua University, Beijing, Beijing, China*



NOTES

TRACK 3 ADVANCES IN AEROSPACE TECHNOLOGY

- 3-1-1: General Aerospace**
- 3-2-1: Advances in Aerodynamics**
- 3-3-1: Novel Aerodynamics and Aerospace Propulsion Systems**
- 3-4-1: Advances in Aerospace Structures and Materials – 1**
- 3-4-2: Advances in Aerospace Structures and Materials – 2**
- 3-5-1: Beam, Plate, and Shell Structures**
- 3-6-1; Lightweight Sandwich Composites and Layered Structures – 1 (in Honor of Prof. Frostig)**
- 3-6-2: Lightweight Sandwich Composites and Layered Structures – 2 (in Honor of Prof. Frostig)**
- 3-7-1: Dynamic Behavior of Composites**
- 3-8-1: Dynamics and Control of Aerospace Structures**
- 3-9-1: Materials and Structures at High Temperature and Extreme Conditions**
- 3-10-1: Impact, Damage and Fracture of Composite Structures**
- 3-12-1: Peridynamics Modeling – 1**
- 3-12-2: Peridynamics Modeling – 2**
- 3-12-3: Peridynamics Modeling – 3**
- 3-13-1: Multibody Dynamics Simulation in Aerospace Structures**
- 3-17-1: Nonlinear Problems in Aerospace Structures**
- 3-18-1: Congress-Wide Symposium on NDE&SHM – Structural Health Monitoring of Aerospace Vehicles**
- 3-19-1: Congress-Wide Symposium on NDE&SHM – Nondestructive Evaluation and Structural Health Monitoring of Composite Materials and Structures**
- 3-20-1: Advances in Aerospace Technology Plenary I**
- 3-20-2: Advances in Aerospace Technology Plenary II**

ACKNOWLEDGMENT

Track Organizer

Weihua Su, *University of Alabama, United States*
 Yingtao Liu, *University of Oklahoma, United States*

Topic Organizers

Jose C. Pascoa, *Universidade Da Beira Interior, Portugal*
 Michele Trancossi, *Sheffield Hallam University – ACES, United Kingdom*
 Jakson Augusto Leger Monteiro, *University of Cape Verde, Cape Verde*
 Carlos Xisto, *Chalmers University of Technology, Sweden*
 Abdollah Afjeh, *University of Toledo, United States*
 Dianyun Zhang, *University of Connecticut, United States*
 Yingtao Liu, *University of Oklahoma, United States*
 Xin Ning, *Pennsylvania State University, United States*
 Zahra Sotoudeh, *Cal Poly Pomona, United States*
 Xin-Lin Gao, *Southern Methodist University, United States*
 Victor Birman, *Missouri University of Science and Technology, United States*

States

Oded Rabinovitch, *Technion – Israel Institute of Technology, Israel*
 Zhangxian Yuan, *Georgia Inst of Technology, United States*
 Weiyi Lu, *Michigan State University, United States*
 Baoxing Xu, *University of Virginia, United States*
 Meng Wang, *University of California, San Diego, United States*
 Uttam Chakravarty, *University of New Orleans, United States*
 Nikolaos Xiros, *University of New Orleans, Naval Arch & Marine Eng., United States*
 Evan Pineda, *NASA Glenn Research Center, United States*
 Natasha Vermaak, *Lehigh University, United States*
 Pavana Prabhakar, *University of Wisconsin-Madison, United States*
 Kwek Tze Tan, *The University of Akron, United States*
 Ali Najafi, *ANSYS Inc., United States*
 Erdogan Madenci, *University of Arizona, United States*
 Erkan Oterkus, *University of Strathclyde, United Kingdom*

Jinwei Shen, *University of Alabama, United States*
 Erasmo Carrera, *Politecnico Di Torino, Italy*
 Matteo Filippi, *Politecnico Di Torino, Italy*
 Alfonso Pagani, *Politecnico Di Torino, Italy*
 Yiska Goldfeld, *Technion – Israel Institute of Technology, Israel*
 Andrei Zagrai, *New Mexico Institute of Mining & Technology, United States*
 Francesco Lanza Di Scalea, *University of California San Diego, United States*
 Yanfeng Shen, *Shanghai Jiao Tong University, China*

Session Organizers

Caglar Oskay, *Vanderbilt University, United States*
 George Kardomateas, *Georgia Institute of Technology, United States*
 Charles Wojnar, *Missouri S&T, United States*

TRACK 3 ADVANCES IN AEROSPACE TECHNOLOGY

WEDNESDAY, NOVEMBER 14

3-20 PLENARY

3-20-1 Advances in Aerospace Technology Plenary I
Third Floor, David L. Lawrence Convention Center, Room 304
9:00am–9:45am

9:00am – Rapid, Physics-Based Reduced Order Modeling of Nonlinear Aerodynamics

Plenary Presentation. IMECE2018-90092

Marilyn Smith, Georgia Institute of Technology, Atlanta, GA, United States

3-1 GENERAL AEROSPACE

3-1-1 General Aerospace
Third Floor, David L. Lawrence Convention Center, Room 308
10:00am–11:45am

Session Chair: Yingtao Liu, University of Oklahoma, Norman, OK, United States

Session Co-Chair: Caglar Oskay, Vanderbilt University, Nashville, TN, United States

10:00am – Photo-Acoustic Based Non-Contact and Non-Destructive Evaluation for Detection of Damage Precursors in Composites

Technical Paper Publication. IMECE2018-86148

Siqi Wang, Liangzhong Xiang, Yingtao Liu, Hong Liu, University of Oklahoma, Norman, OK, United States

10:21am – Fabrication, Optimization, and Characterization of PDMS/CNF Nanocomposite Sensor Arrays

Technical Paper Publication. IMECE2018-86269

Wenyuan Luo, Yingtao Liu, Mrinal Saha, University of Oklahoma, Norman, OK, United States, Steven Patterson, Thomas Robison, NNSA's National Security Campus operated by Honeywell, Kansas City, MO, United States

10:42am – Design and Optimization of a Multipurpose Urban Firefighting and Disaster Relief UAV

Technical Paper Publication. IMECE2018-86321

Mohammed Mayeed, Kennesaw State University, Marietta, GA, United States

11:03am – About the Immediate Shift From Large-Sized Machine Boeing 747 to Boeing 777

Technical Paper Publication. IMECE2018-86770

Masako Shishido, IWATE University, Morioka, Japan

11:24am – EHS Primary Flight Controls Seals Wear Degradation Model

Technical Paper Publication. IMECE2018-87080

Antonio C. Bertolino, Rocco Gentile, Giovanni Jacazio, Francesco Marino, Massimo Sorli, Politecnico di Torino, Torino, Italy

3-18 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM: STRUCTURAL HEALTH MONITORING OF AEROSPACE VEHICLES

3-18-1 Congress-Wide Symposium on NDE & SHM: Structural Health Monitoring of Aerospace Vehicles
Third Floor, David L. Lawrence Convention Center, Room 307
10:00am–11:45am

Session Chair: Yiska Goldfeld, Technion - Israel Institute of Technology, Haifa, Israel

Session Co-Chair: Andrei Zagrai, New Mexico Institute of Mining & Technology, Socorro, NM, United States

10:00am – INTEGRATING THREE INSPECTION/MONITORING METHODS FOR AEROSPACE APPLICATIONS

Technical Presentation. IMECE2018-87548

Amir Nasrollahi, Piervincenzo Rizzo, University of Pittsburgh, Pittsburgh, PA, United States

10:21am – Hybrid Carbon Based Textile Reinforcement for Monitoring Water Infiltration

Technical Presentation. IMECE2018-89241

Yiska Goldfeld, Gali Perry, Technion - Israel Institute of Technology, Haifa, Israel, Gözdem Dittel, Till Quadflieg, Thomas Gries, RWTH Aachen University, Aachen, Germany

10:42am – Disbond Detection in a Honeycomb Composite Plate Using an Ultrasonic Method

Technical Presentation. IMECE2018-89310

Ajit Mal, Fei Gao, Lifu Wang, Steffen Tai, Leonardo Araque, University of California, Los Angeles, Los Angeles, CA, United States, Jing Lin, Beihang University, Beijing, Beijing, China

11:03am – Development of in Orbit Guided Wave Experiments

Technical Presentation. IMECE2018-89508

John Sanchez, Andrei Zagrai, New Mexico Institute of Mining & Technology, Socorro, NM, United States

11:24am – A Piezoelectric-Based Wireless Sensor for Monitoring Strain Through Inductive Coupling

Technical Presentation. IMECE2018-89947

Paul Ferri, Xiyue Zou, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Patrick V. Hull, NASA Marshall Space Flight Center, Huntsville, AL, United States, Aaron Mazzeo, Rutgers, The State University of New Jersey, Piscataway, NJ, United States

3-4 ADVANCES IN AEROSPACE STRUCTURES AND MATERIALS

3-4-1 Advances in Aerospace Structures and Materials – 1

Third Floor, David L. Lawrence Convention Center, Room 308
1:45pm–3:30pm

Session Chair: Dianyun Zhang, *University of Connecticut, Storrs, CT, United States*

Session Co-Chair: Xin Ning, *Pennsylvania State University, Urbana, IL, United States*

1:45pm – The Effects of Layer-by-Layer Thickness and Fiber Volume Fraction Variation on the Mechanical Performance of a Pressure Vessel

Technical Paper Publication. IMECE2018-86468
Emre Özaslan, Volkan Coskun, Ali Yetgin, Bülent Acar, Tarik Olgar, *Roketsan Inc., Ankara, Turkey*

2:06pm – Recent Advancements in Spikes Used in Hypersonic Re-Entry Vehicles by Using CFD

Technical Paper Publication. IMECE2018-86550
E.L.N. Rohit Madhukar, *Koneru Lakshmaiah Educational Foundation, Durg, Chhattisgarh, India*, Harish Panjagala, *Koneru Lakshmaiah Educational Foundation, Guntur, Andhra Pradesh, India*

2:27pm – Effect of Different Cutting Depths to the Cutting Forces and Machining Quality of CFRP Parts in Orthogonal Cutting: A Numerical and Experimental Comparison

Technical Paper Publication. IMECE2018-87008
Farid Miah, *Institut Clement Ader, Toulouse, France*, Emmanuel De-Luycker, *Université de Toulouse, INP-ENIT, Tarbes, France*, Frederic Lachaud, Yann Landon, Robert Piquet, *Institut Clément Ader, Université de Toulouse, CNRS, INSA, ISAE-SUPAERO, Mines Albi, UPS, Toulouse, France*

2:48pm – Development of Structural Neural Network Design Tool for Buckling Behaviour of Skin-Stringer Structures Under Combined Compression and Shear Loading

Technical Paper Publication. IMECE2018-87970
Aydin Okul, *Turkish Aerospace Industry, Ankara, Turkey*, Ercan Gurses, *Middle East Technical University, Ankara, Turkey*

3:09pm – Determination of Johnson Cook Material Model Constants and Their Influence on Machining Simulations of Tungsten Heavy Alloy

Technical Paper Publication. IMECE2018-88270
Kiran Sagar Chithajalu, Amrita Priyadarshini, Amit Kumar Gupta, Sidharth Kumar Shukla, *BITS Pilani Hyderabad Campus, Hyderabad, Telengana, India*

3-12 PERIDYNAMICS MODELING

3-12-1 Peridynamics Modeling – 1

Third Floor, David L. Lawrence Convention Center, Room 306
1:45pm–3:30pm

Session Chair: Erdogan Madenci, *University of Arizona, Tucson, AZ, United States*

Session Co-Chair: Erkan Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

1:45pm – Peridynamic Modeling Using a Commercial Finite Element Software

Technical Presentation. IMECE2018-86022
Zhenghao Yang, Mingyang Li, Erkan Oterkus, Selda Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

2:06pm – Peridynamics/Digital Imaging Correlation for Tracking Crack Propagation Paths

Technical Presentation. IMECE2018-89721
Erdogan Madenci, *University of Arizona, Tucson, AZ, United States*, Amin Yaghoobi, Atila Barut, *Global Engineering Research and Technologies, Tucson, AZ, United States*, Nam Phan, *Naval Air Systems Command (NAVAIR), Patuxent River, MD, United States*

2:27pm – Peridynamic Modelling of Fatigue Crack Growth In Welded Joints

Technical Presentation. IMECE2018-89663
Kyutack Hong, Selda Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

2:48pm – One Inclusion in the Infinite Peristatic Matrix

Technical Paper Publication. IMECE2018-86519
Valeriy Buryachenko, *Micromechanics & Composites LLC, Dayton, OH, United States*

3:09pm – Fully Coupled Thermomechanical Peridynamic Analysis of Composite Structures

Technical Presentation. IMECE2018-89547
Yan Gao, Selda Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

3-19 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM: NONDESTRUCTIVE EVALUATION AND STRUCTURAL HEALTH MONITORING OF COMPOSITE MATERIALS AND STRUCTURES

3-19-1 Congress-Wide Symposium on NDE & SHM: Nondestructive Evaluation and Structural Health Monitoring of Composite Materials and Structures
Third Floor, David L. Lawrence Convention Center, Room 307
1:45pm–3:30pm

Session Chair: Francesco Lanza Di Scalea, *University of California San Diego, La Jolla, CA, United States*

Session Co-Chairs: Yanfeng Shen, *Shanghai Jiao Tong University, Shanghai, China*, Andrei Zagrai, *New Mexico Institute of Mining & Technology, Socorro, NM, United States*

1:45pm – Application of Interface Guided Waves for Inspection of Hybrid Bonded Joints: Semi Analytical Final Element Approach

Technical Presentation. IMECE2018-86075

Mark Jahanbin, *Villanova University / Boeing Company, Mukilteo, WA, United States*, **Sridhar Santhanam**, *Villanova University, Collegeville, PA, United States*

2:06pm – Guided Wave Generation and Propagation in Self-Sensing Piezoelectric Composite Plates for Structural Health Monitoring

Technical Paper Publication. IMECE2018-86229

Junzhen Wang, *Yanfeng Shen, Shanghai Jiao Tong University, Shanghai, China*

2:27pm – Advanced Structural Testing With Optical Metrology

Technical Presentation. IMECE2018-87519

Jack Irwin, *Trillion Quality Systems, King of Prussia, PA, United States*

2:48pm – Guided Wave Techniques for Damage Detection in Composite Aerospace Structures

Technical Presentation. IMECE2018-89370

Francesco Lanza Di Scalea, *Margherita Capriotti, Ranting Cui, University of California San Diego, La Jolla, CA, United States*, **Antonino Spada**, *University of Palermo, Palermo, Italy*

3-2 ADVANCES IN AERODYNAMICS

3-2-1 Advances in Aerodynamics

Third Floor, David L. Lawrence Convention Center, Room 307
3:45pm–5:30pm

Session Chair: Jose C. Pascoa, *Universidade Da Beira Interior, Covilha, Portugal*

Session Co-Chairs: Michele Trancossi, *Sheffield Hallam University - ACES, Sheffield, Sheffield, United Kingdom*, Jakson Augusto Leger Monteiro, *University of Cape Verde, Praia, Cape Verde*

3:45pm – Solution to Optimize the Airfoils Shapes Placed Into a Supersonic Viscous Flow

Technical Paper Publication. IMECE2018-86781

Victorita Radulescu, *University Politehnica of Bucharest, Bucharest, Romania*

4:06pm – Investigations on Unsteady Flow Excitation and Mechanical Performance of Last Turbine Stage Long Blade Using Fluid-Structure Interaction Method

Technical Paper Publication. IMECE2018-86950

Jun Li, *Zhigang Li, Liming Song, Xian Jiaotong University, Xian, Shaanxi, China*, **Qinghua Deng**, *Xi'An Jiaotong University, Xi'An, China*

4:27pm – Effects of Harmonic Vibration on Cycloidal Rotor Performance

Technical Paper Publication. IMECE2018-87103

Jakson Augusto Leger Monteiro, *University of Cape Verde, Praia, Cape Verde*, **Jose C. Pascoa**, *Universidade Da Beira Interior, Covilha, Portugal*

4:48pm – CFD-Based Aerodynamic Analysis of the Flow Past an Airfoil With Passive Trapezoidal and Perforated Vortex Generators

Technical Paper Publication. IMECE2018-87440

Charbel Bou-Mosleh, *Rawad Himo, Charbel Habchi, Notre Dame University - Louaize, Zouk Mosbeh, Lebanon*

5:09pm – Experimental Analysis of Alternative Dielectric Materials for DBD Plasma Actuators

Technical Paper Publication. IMECE2018-87455

Frederico Rodrigues, *Jose C. Pascoa, Universidade da Beira Interior, Covilha, Portugal*, **Michele Trancossi**, *Sheffield Hallam University, Sheffield, United Kingdom*

3-7 DYNAMIC BEHAVIOR OF COMPOSITES

3-7-1 Dynamic Behavior of Composites

Third Floor, David L. Lawrence Convention Center, Room 306
3:45pm–5:30pm

Session Chair: Weiyi Lu, *Michigan State University, East Lansing, MI, United States*

Session Co-Chairs: Baoxing Xu, *University of Virginia, Charlottesville, VA, United States*, Meng Wang, *University of California, San Diego, La Jolla, CA, United States*

3:45pm – Energy Capture Mechanism of Liquid Nanofoam for Blast Wave Mitigation

Technical Presentation. IMECE2018-89404

Weiyi Lu, *Michigan State University, East Lansing, MI, United States*

4:06pm – Liquid Nanofoam System Under Compression: Competition Between Liquid Infiltration and Nanopore Deformation

Technical Presentation. IMECE2018-89110

Yue Zhang, *University of Virginia, Charlottesville, VA, United States*, **Mingzhe Li**, *Michigan State University, East Lansing, MI, United States*, **Baoxing Xu**, *University of Virginia, Charlottesville, VA, United States*, **Weiyi Lu**, *Michigan State University, East Lansing, MI, United States*

4:27pm – Enhanced Interaction Between Filler and Tube Wall in Liquid Nanofoam-Filled Thin-Walled Tubes

Technical Presentation. IMECE2018-89287

Mingzhe Li, **Junfeng Li**, *Michigan State University, East Lansing, MI, United States*, **Saeed Barbat**, *Ford Motor Company, Dearborn, MI, United States*, **Mohamed Ridha Baccouche**, *Ford, Ann Arbor, MI, United States*, **Weiyi Lu**, *Michigan State University, East Lansing, MI, United States*

4:48pm – Behavior of Lithium-Ion Battery Pouch Cells Under Dynamic Penetration

Technical Presentation. IMECE2018-88858

Meng Wang, *University of California, San Diego, La Jolla, CA, United States*

5:09pm – Static and Dynamic Mechanical Behavior of Suspended Graphene/Silver NanoWire/Graphene (Gr/AgNW/Gr) Composite

Technical Presentation. IMECE2018-89529

Chenglin Wu, **Chuanrui Guo**, **Yanxiao Li**, *Missouri University of Science and Technology, Rolla, MO, United States*, **David Veyssset**, **Yuchen Sun**, **Steven E. Kooi**, **Keith A. Nelsom**, *Massachusetts Institute of Technology, Cambridge, MA, United States*, **Genda Chen**, *Missouri University of Science and Technology, Rolla, MO, United States*

THURSDAY, NOVEMBER 15

3-20 PLENARY

3-20-2 Advances in Aerospace Technology Plenary II
Third Floor, David L. Lawrence Convention Center, Room 305
8:00am–8:45am

8:00am – On the Flightpath to Adaptive Aerospace Structures: Articulated Tensegrity

Plenary Presentation. IMECE2018-90093

George Lesieutre, *Pennsylvania State University, University Park, PA, United States*

3-6 LIGHTWEIGHT SANDWICH COMPOSITES AND LAYERED STRUCTURES—IN HONOR OF PROF. FROSTIG

3-6-1 Lightweight Sandwich Composites and Layered Structures – 1 (in Honor of Prof. Frostig)

Third Floor, David L. Lawrence Convention Center, Room 306
8:55am–10:40am

Session Chair: Victor Birman, *Missouri University of Science and Technology, St. Louis, MO, United States*

Session Co-Chair: George Kardomateas, *Georgia Institute of Technology, Alpharetta, GA, United States*

8:55am – Structural Modelling of Reinforced Cement Composite Under Uniaxial Loading

Technical Presentation. IMECE2018-88960

Yiska Goldfeld, *Technion - Israel Institute of Technology, Haifa, Israel*

9:10am – Advanced Zig-Zag Beam Theories for Sandwich Structures Analyses

Technical Paper Publication. IMECE2018-86783

Matteo Filippi, **Erasmus Carrera**, *Politecnico Di Torino, Torino, Italy*

9:25am – Higher-Order Shell Element for the Static and Free-Vibration Analysis of Sandwich Structures

Technical Paper Publication. IMECE2018-86784

Erasmus Carrera, **Stefano Valvano**, **Matteo Filippi**, *Politecnico di Torino, Torino, Italy*

9:40am – Nonlocal Beam and Plate Models From Three-Dimensional Stress Gradient Elasticity

Technical Presentation. IMECE2018-87739

Isaac Elishakoff, *Florida Atlantic University, Boca Raton, FL, United States*, **Florian Hache**, *Florida Atlantic University, Moussey Le Neuf, France*, **Noel Challamel**, *University Bretagne Sud, Lorient, France*

9:55am – Optimization of the Composite Airplane Fuselage for an Optimum Structural Integrity**Technical Paper Publication. IMECE2018-88215****Athreya Nagesh**, *Penn State Harrisburg, Middletown, PA, United States*, **Ola Rashwan**, *Penn State University, Middletown, PA, United States*, **Ma'moun Abu-Ayyad**, *Penn State Harrisburg, Middletown, PA, United States***10:10am – Control of Fracture at the Interface of Dissimilar Materials Using Randomly Oriented Inclusions and Fiber Networks****Technical Presentation. IMECE2018-88664****Victor Birman**, *Missouri University of Science and Technology, St. Louis, MO, United States***3-8 DYNAMICS AND CONTROL OF AEROSPACE STRUCTURES****3-8-1 Dynamics and Control of Aerospace Structures****Third Floor, David L. Lawrence Convention Center, Room 307
8:55am–10:40am****Session Chair:** Uttam Chakravarty, *University of New Orleans, Kenner, LA, United States***Session Co-Chair:** Nikolaos Xiros, *University of New Orleans, New Orleans, LA, United States***8:55am – Active Vibration Control of a Helicopter Rotor Blade by Using a Linear Quadratic Regulator****Technical Paper Publication. IMECE2018-86319****Md. Mosleh Uddin, Pratik Sarker**, *University of New Orleans, New Orleans, LA, United States*, **Colin R. Theodore**, *NASA Ames Research Center, Mountain View, CA, United States*, **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States***9:10am – A Comparative Study Between Selective Laser Melting and Electron Beam Additive Manufacturing Based on Thermal Modeling****Technical Paper Publication. IMECE2018-86428****M. Shafiqur Rahman, Paul Schilling, Paul D. Herrington**, *University of New Orleans, New Orleans, LA, United States*, **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States***9:25am – An Analysis of Harmonic Airloads Acting on Helicopter Rotor Blades****Technical Paper Publication. IMECE2018-86625****Iftekhar Alam Riyad**, *University of New Orleans, New Orleans, LA, United States*, **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States***9:40am – A Hybrid Energy Harvesting System Based on Solar Radiation and Mechanical Vibration****Technical Paper Publication. IMECE2018-86928****M. Shafiqur Rahman**, *University of New Orleans, New Orleans, LA, United States*, **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States***9:55am – System Identification of Hydrokinetic Energy Harvester Using Flow Induced Oscillations****Technical Paper Publication. IMECE2018-87059****Ralph Saxton, Soumyadip Patra, Nikolaos Xiros**, *University of New Orleans, New Orleans, LA, United States*, **Michael Bernitsas, Hai Sun**, *University of Michigan, Ann Arbor, MI, United States***10:10am – Characterizations of Diagnostic Properties and Detection Techniques of Fentanyl and Related Synthetic Opioids****Technical Paper Publication. IMECE2018-87803****M. Shafiqur Rahman**, *University of New Orleans, New Orleans, LA, United States*, **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States***3-9 HIGH TEMPERATURE MATERIALS AND STRUCTURES****3-9-1 Materials and Structures at High Temperature and Extreme Conditions****Fourth Floor, David L. Lawrence Convention Center, Room 403
8:55am–10:40am****Session Chair:** Evan Pineda, *NASA Glenn Research Center, Cleveland, OH, United States***Session Co-Chairs:** Natasha Vermaak, *Lehigh University, Bethlehem, PA, United States*, Pavana Prabhakar, *University of Wisconsin-Madison, Madison, WI, United States***8:55am – Method of Fundamental Solution in Thermoelasticity of Random Structure Matrix Composites****Technical Paper Publication. IMECE2018-86515****Valeriy Buryachenko**, *Micromechanics & Composites LLC, Dayton, OH, United States***9:16am – Optimization of Spatially Tailored Metal-Ceramic Composite Airframe in a High-Speed Environment****Technical Presentation. IMECE2018-87960****Phillip Deierling**, *University of Iowa, Iowa City, IA, United States*, **Emily Dryer**, *Ohio State University, Columbus, OH, United States*, **Olesya Zhupanska**, *University of Arizona, Tucson, AZ, United States***9:37am – Microstructure Based Constitutive Model for Two-Phase Superalloys****Technical Presentation. IMECE2018-88358****Masoud Ghorbani Moghaddam**, *Medical College of Wisconsin, Milwaukee, WI, United States*, **Ajit Achuthan**, *Clarkson University, Potsdam, NY, United States*, **Brett A. Bednarczyk, Steven Arnold, Evan Pineda**, *NASA Glenn Research Center, Cleveland, OH, United States***9:58am – Effects of Microstructure on the Viscoplastic Response of Sea Ice****Technical Presentation. IMECE2018-89408****Shuvrangu Das, Pedro Ponte Castañeda**, *University of Pennsylvania, Philadelphia, PA, United States*

10:19am – A Novel Methodology for Accurate Determination of Local Interphase Modulus Gradients in Model Nanocomposites

Technical Presentation. IMECE2018-89667
Pavan Kolluru, *Duke University, Durham, NC, United States*,
Min Zhang, *Northwestern University, Evanston, IL, United States*,
L. Catherine Brinson, *Duke University, Durham, NC, United States*

3-5 BEAM, PLATE, AND SHELL STRUCTURES

3-5-1 Beam, Plate, and Shell Structures

Fourth Floor, David L. Lawrence Convention Center, Room 403
10:50am–12:35pm

Session Chair: Zahra Sotoudeh, *Cal Poly Pomona, Ontario, CA, United States*

Session Co-Chair: Xin-Lin Gao, *Southern Methodist University, Dallas, TX, United States*

10:50am – Finite Element Modelling of TBC Failure Mechanisms by Using XFEM

Technical Paper Publication. IMECE2018-86576
Safa Mesut Bostanci, *Aselsan A.S., Ankara, Turkey*,
Ercan Gurses, **Demirkan Coker**, *Middle East Technical University, Ankara, Turkey*

11:11am – Mixed One-/Two-Dimensional Models With Node Dependent Kinematic Capabilities for the Analysis of Metallic and Composite Structures

Technical Paper Publication. IMECE2018-87490
Enrico Zappino, **Erasmus Carrera**, *Politecnico di Torino, Torino, Italy*

11:32am – New Non-Classical Kirchhoff Rod Model Incorporating the Microstructure Effect

Technical Presentation. IMECE2018-89994
Gongye Zhang, **Xin-Lin Gao**, *Southern Methodist University, Dallas, TX, United States*

11:53am – Residual Strength Prediction of 3D Textile Composites Under Combined Mechanical Loading and Hostile Environmental Conditions

Technical Presentation. IMECE2018-89772
Qingda Yang, **Yuhang Yang**, *University of Miami, Coral Gables, FL, United States*

12:14pm – A Preliminary Design Method for Axial Turbine

Technical Paper Publication. IMECE2018-88251
Fan Yang, *Xi'an Jiaotong University, Xi'an, China*,
Lei Li,
Shouyi Sun, *Northwestern Polytechnical University, Xi'an, China*

3-6 LIGHTWEIGHT SANDWICH COMPOSITES AND LAYERED STRUCTURES—IN HONOR OF PROF. FROSTIG

3-6-2 Lightweight Sandwich Composites and Layered Structures – 2 (in Honor of Prof. Frostig)
Third Floor, David L. Lawrence Convention Center, Room 306
10:50am–12:35pm

Session Chair: Zhangxian Yuan, *Georgia Institute of Technology, Atlanta, GA, United States*

Session Co-Chair: Oded Rabinovitch, *Technion - Israel Institute of Technology, Haifa, Israel*

10:50am – Flexural Elastic Wave Propagation in a Periodic Composite Plate Structure Incorporating Microstructure, Surface Energy and Foundation Effects

Technical Presentation. IMECE2018-87262
Gongye Zhang, **Xin-Lin Gao**, *Southern Methodist University, Dallas, TX, United States*

11:05am – Hygro-Thermal 2D Debonding in Sandwich-Like Tiles

Technical Presentation. IMECE2018-88718
Shai Feldfogel, **Oded Rabinovitch**, *Technion - Israel Institute of Technology, Haifa, Israel*

11:20am – Dynamic Stability Behavior of Sandwich Panels Under Impulsive Axial Loads

Technical Presentation. IMECE2018-88946
Zhangxian Yuan, *Georgia Institute of Technology, Atlanta, GA, United States*,
George Kardomateas, *Georgia Institute of Technology, Alpharetta, GA, United States*

11:35am – A High Order Approach for Sandwich Beams With Face/Core debonds

Technical Presentation. IMECE2018-88947
Zhangxian Yuan, *Georgia Institute of Technology, Atlanta, GA, United States*,
George Kardomateas, *Georgia Institute of Technology, Alpharetta, GA, United States*,
Leif Carlsson, *Florida Atlantic University, Boca Raton, FL, United States*

11:50am – Exact Analytical Buckling Loads Calculation of Thin Orthotropic Plates

Technical Presentation. IMECE2018-88959
Moshe Eisenberger, *Technion - Israel Institute of Technology, Technion City, Israel*,
Joseph Tenenbaum, **Aharon Deutsch**, *Technion - Israel Institute of Technology, Haifa, Israel*

12:05pm – Influence of Core Deformation Constraints on Energy Release Rate in Debonding of Honeycomb Core Sandwich

Technical Presentation. IMECE2018-89804
Mohammad Tauhiduzzaman, **Leif Carlsson**, *Florida Atlantic University, Boca Raton, FL, United States*

3-12 PERIDYNAMICS MODELING

3-12-2 Peridynamics Modeling – 2

Third Floor, David L. Lawrence Convention Center, Room 307
10:50am–12:35pm

Session Chair: Erkan Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

Session Co-Chair: Erdogan Madenci, *University of Arizona, Tucson, AZ, United States*

10:50am – Peridynamic Modeling of Composite Laminates
Technical Presentation. IMECE2018-89554

Erdogan Madenci, Mehmet Dorduncu, *University of Arizona, Tucson, AZ, United States*, **Nam Phan,** *Naval Air Systems Command (NAVAIR), Patuxent River, MD, United States*

11:11am – Peridynamics Formulation for Beam Structures
Technical Presentation. IMECE2018-89550

Cong Tien Nguyen, Selda Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

11:32am – Modeling Material Anisotropy with Peridynamics: Part I

Technical Presentation. IMECE2018-89962

Pablo Seleson, Jeremy Trageser, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Max Gunzburger,** *Florida State University, Tallahassee, FL, United States*

11:53am – Modeling Material Anisotropy with Peridynamics: Part II

Technical Presentation. IMECE2018-89970

Pablo Seleson, Jeremy Trageser, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Max Gunzburger,** *Florida State University, Tallahassee, FL, United States*

12:14pm – Generalized Mori-Tanaka Approach in Micromechanics of Random Structure Peristatic Composites

Technical Presentation. IMECE2018-89218

Valeriy Buryachenko, *Micromechanics & Composites LLC, Dayton, OH, United States*

3-3 NOVEL AEROSPACE PROPULSION SYSTEMS

3-3-1 Novel Aerodynamics and Aerospace Propulsion Systems

Fourth Floor, David L. Lawrence Convention Center, Room 403
2:05pm–3:50pm

Session Chair: Jose C. Pascoa, *Universidade Da Beira Interior, Covilha 6200, Portugal*

Session Co-Chairs: Carlos Xisto, *Chalmers University of Technology, Göteborg, Sweden*, Abdollah Afjeh, *University of Toledo, Toledo, OH, United States*

2:05pm – Numerical Analysis of a Multi-Species MHD Model for Plasma Layer Control of Re-Entry Vehicles
Technical Paper Publication. IMECE2018-87467

Filipe Dias, *Universidade da Beira Interior, Covilhã, Portugal*, **Carlos Xisto,** *Chalmers University of Technology, Göteborg, Sweden*, **Jose C. Pascoa,** *Universidade da Beira Interior, Covilha, Portugal*

2:26pm – Flight Load Analysis and Prediction Based on Scaled Sequential Threshold Least-Squares (S2TLS) Algorithm

Technical Presentation. IMECE2018-88993

Shengwei Zhu, Yi Wang, *University of South Carolina, Columbia, SC, United States*

2:47pm – A Novel Approach for Satellite Attitude Control by Using Solar Sailing

Technical Paper Publication. IMECE2018-88311

Ni Li, P. Arguelles, K. Chaput, S. Kenan, S. Kim, D. Li, Y. Vazquez, D. Viveros, T. Nye, *California State University, Los Angeles, Los Angeles, CA, United States*, **K. Salinas,** *Northrop Grumman, Carson, CA, United States*

3:08pm – A Review of Propulsion Systems for Cubesats

Technical Paper Publication. IMECE2018-88174

Jose C. Pascoa, Odelma Teixeira, Gustavo Filipe, *Universidade da Beira Interior, Covilhã, Portugal*

3-4 ADVANCES IN AEROSPACE STRUCTURES AND MATERIALS

3-4-2 Advances in Aerospace Structures and Materials – 2

Third Floor, David L. Lawrence Convention Center, Room 306
2:05pm–3:50pm

Session Chair: Yingtao Liu, *University of Oklahoma, Norman, OK, United States*

Session Co-Chair: Dianyun Zhang, *University of Connecticut, Storrs, CT, United States*

2:05pm – Method of Creating Composite Manufacture Drawing

Technical Presentation. IMECE2018-88823

Chethan Rangaswamy, *Rolls-Royce, Pune, India*

2:26pm – Static Failure Analysis of Textile Composite Structures Using Mechanics of Structure Genome in MSC.NASTRAN

Technical Presentation. IMECE2018-89175
 Xin Liu, *Purdue University, West Lafayette, IN, United States*,
 Federico Gasco, *Spirit AeroSystems, Inc., Wichita, KS, United States*,
 Wenbin Yu, *Purdue University, West Lafayette, IN, United States*

2:47pm – Low-Velocity Impact and Interlaminar Fracture Toughness of Unidirectional and Quasi 3D Braided Composite

Technical Presentation. IMECE2018-89719
 Tony Wente, *Michigan State University, Lansing, MI, United States*,
 Danielle Zeng, *Ford, Dearborn, MI, United States*,
 Xinran Xiao, *Michigan State University, Lansing, MI, United States*

3:08pm – Imperfection-Insensitive Axially Loaded Cylindrical Shells

Technical Presentation. IMECE2018-89894
 Xin Ning, *Pennsylvania State University, Urbana, IL, United States*

3:29pm – Homogenization Estimates for Viscoelastic Composites Based on an Incremental Variational Principle

Technical Presentation. IMECE2018-89598
 Jose E. Coteló Alonso, *Pedro Ponte Castañeda, University of Pennsylvania, Philadelphia, PA, United States*

3-10 IMPACT, DAMAGE AND FRACTURE OF COMPOSITE STRUCTURES

3-10-1 Impact, Damage and Fracture of Composite Structures

**Third Floor, David L. Lawrence Convention Center, Room 307
 2:05pm–3:50pm**

Session Chair: Kwek Tze Tan, *University of Akron, Akron, OH, United States*

Session Co-Chair: Ali Najafi, *ANSYS Inc., Houston, TX, United States*

2:05pm – Mode-II Crack Initiation of Carbon Fiber Epoxy Under Marine Conditions

Technical Presentation. IMECE2018-89875
 Rodrigo Chavez, *Veronica Eliasson, University of California San Diego, La Jolla, CA, United States*

2:20pm – Composite Fan Case Damage From Fan Blade Out Replicated With Flat Panel Gas Gun Testing

Technical Presentation. IMECE2018-89178
 Andy VanderKlok, *Williams International, Commerce Charter Township, MI, United States*,
 Jim Dorer, *Xinran Xiao, Michigan State University, Lansing, MI, United States*

2:35pm – Experimental Specimen for Classification of Matrix Compression Damage in Carbon Fiber Reinforced Polymers

Technical Paper Publication. IMECE2018-87132
 Taylor Rawlings, *Kevin Carpenter, John P. Parmigiani, Oregon State University, Corvallis, OR, United States*

2:50pm – Effect of Low Temperature Arctic Conditions on Impact and Post-Impact Mechanisms of Composite Sandwich Structures

Technical Presentation. IMECE2018-88556
 Kwek Tze Tan, *Mahfujul Khan, University of Akron, Akron, OH, United States*

3:05pm – Lightning Strike Protection and EMI Shielding of Fiber Reinforced Composite Using Gold and Silver Nanofilms

Technical Paper Publication. IMECE2018-88639
 Praveen Bollavaram, *Muhammad Rahman, Ramazan Asmatulu, Wichita State University, Wichita, KS, United States*

3:20pm – Elastic Metamaterial Design to Filter Harmonic Mechanical Wave Propagation

Technical Paper Publication. IMECE2018-87753
 Gustavo Rodrigues, *Universidade Estácio de Sá, Rio de Janeiro, Brazil*,
 Hans Weber, *Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil*,
 Larissa Driemeier, *University of São Paulo, São Paulo, Brazil*

3-12 PERIDYNAMICS MODELING

3-12-3 Peridynamics Modeling – 3

**Third Floor, David L. Lawrence Convention Center, Room 307
 4:00pm–5:45pm**

Session Chair: Erdogan Madenci, *University of Arizona, Tucson, AZ, United States*

Session Co-Chair: Erkan Oterkus, *University of Strathclyde, Glasgow, United Kingdom*

4:00pm – Peridynamic Model to Predict Fracture Evolution During Lithiation Process

Technical Presentation. IMECE2018-89372
 Hanlin Wang, *Erkan Oterkus, Selda Oterkus, University of Strathclyde, Glasgow, United Kingdom*

4:21pm – Peridynamic Modeling of Concrete Pavement Structures

Technical Presentation. IMECE2018-89515
 Nicolas Sau, *Jose Medina, Universidad de Sonora, Hermosillo, Sonora, Mexico*

4:42pm – Peridynamic Modeling of a Viscoelastic Material

Technical Presentation. IMECE2018-89659
 Yunke Huang, *Selda Oterkus, University of Strathclyde, Glasgow, United Kingdom*

5:03pm – Computational Homogenization in Peristatics of Periodic Structure Composites

Technical Paper Publication. IMECE2018-86517
 Valeriy Buryachenko, *Micr*

3-13 MULTIBODY DYNAMICS SIMULATION IN AEROSPACE STRUCTURES

3-13-1 Multibody Dynamics Simulation in Aerospace Structures

Fourth Floor, David L. Lawrence Convention Center, Room 403
4:00pm–5:45pm

Session Chair: Jinwei Shen, *University of Alabama, Tuscaloosa, AL, United States*

Session Co-Chair: Charles Wojnar, *Missouri S&T, Rolla, MO, United States*

4:00pm – Real Time Loading Test Rig for Flight Control Actuators Under PHM Experimentation

Technical Paper Publication. IMECE2018-86967
Piergiorgio Chiavaroli, Giuseppe Evangelista, Andrea de Martin, Giovanni Jacazio, Massimo Sorli, *Politecnico di Torino, Torino, TO, Italy*

4:21pm – Experimental Flight Validation of NATASHA's Results for Aeroelastic Analysis of a HALE Aircraft

Technical Presentation. IMECE2018-87878
Ehsan Izadpanahi, Kishan Kalpoe, *Florida International University, Miami, FL, United States*, Pezhman Mardanpour, *Florida International University, Weston, FL, United States*

4:42pm – Fundamental Unstanding of Propeller Whirl Flutter Through Multibody Dynamics Simulation

Technical Presentation. IMECE2018-88792
Christian Hoover, Jinwei Shen, *University of Alabama, Tuscaloosa, AL, United States*

5:03pm – Multibody Dynamics Study of Effects of Hub Type on Tiltrotor Whirl Flutter and Rotor Loads

Technical Presentation. IMECE2018-88793
Kyle Nelson, Jinwei Shen, Christian Hoover, *University of Alabama, Tuscaloosa, AL, United States*

5:24pm – Multibody Dynamics Analysis of Helicopter Rotor-Fuselage Systems

Technical Presentation. IMECE2018-88795
Jennifer Baggett, *University of Alabama, Gardendale, AL, United States*, Jinwei Shen, *University of Alabama, Tuscaloosa, AL, United States*

3-17 NONLINEAR PROBLEMS IN AEROSPACE STRUCTURES

3-17-1 Nonlinear Problems in Aerospace Structures

Third Floor, David L. Lawrence Convention Center, Room 306
4:00pm–5:45pm

Session Chair: Erasmo Carrera, *Politecnico Di Torino, Torino, Italy*

4:00pm – Comparative Study of Post-Buckling Load Redistribution in Stiffened Aircraft Panel With and Without Material Nonlinearity

Technical Paper Publication. IMECE2018-86346
Enes Aydin, *Turkish Aerospace Industries, Ankara, Ankara, Turkey*, Altan Kayran, *METU Center for Wind Energy, Ankara, Turkey*

4:21pm – A Global-Local Strategy for the Elastoplastic Analysis of Complex Metallic Structures via Component-Wise Approach

Technical Paper Publication. IMECE2018-86564
Erasmo Carrera, Ibrahim Kaleel, Manish Nagaraj, Marco Petrolo, *Politecnico di Torino, Torino, Italy*

4:42pm – Evaluation of In-Plane and Out-of-Plane Stresses in Composite Structures Subjected to Large Displacements/Rotations

Technical Paper Publication. IMECE2018-86671
Alfonso Pagani, Riccardo Augello, Erasmo Carrera, *Politecnico di Torino, Torino, Italy*

5:03pm – Virtual Vibration Correlation Technique (VCT) for Nonlinear Analysis of Metallic and Composite Structures

Technical Paper Publication. IMECE2018-86674
Alfonso Pagani, Riccardo Augello, Erasmo Carrera, *Politecnico di Torino, Torino, Italy*

5:24pm – Nonlinear Dynamics of Rotating Structures and Helicopter Blades

Technical Paper Publication. IMECE2018-86786
Matteo Filippi, Alfonso Pagani, Erasmo Carrera, *Politecnico di Torino, Torino, Italy*

TRACK 4 BIOMEDICAL & BIOTECHNOLOGY ENGINEERING

- 4-1-1: Biomedical and Biotechnology Plenary I**
- 4-1-2: Biomedical and Biotechnology Plenary II**
- 4-2-1: Damage Biomechanics I: Blunt Impact Effects and Analysis**
- 4-2-2: Damage Biomechanics II: Ballistic Impact and Blast Effects and Analysis**
- 4-2-3: Damage Biomechanics III: Materials Characterization, Modeling and Analysis**
- 4-2-4: Damage Biomechanics IV: Cavitation as a Mechanism for Brain Injury**
- 4-3-1: Vibration Characteristics and Characterisations**
- 4-3-2: Vibration applications to Therapy and Rehabilitation**
- 4-4-1: Tissue Characterisations**
- 4-4-2: Biomedical Imaging and Characterisation**
- 4-5-1: Biomaterials and Tissue I: Fabrication**
- 4-5-2: Biomaterials and Tissue II: Modelling**
- 4-5-3: Biomaterials and Tissue III: Synthesis and Characterization**
- 4-5-4: Biomaterials and Tissue IV: Synthesis and Characterization**
- 4-6-1: Mechanobiology**
- 4-7-1: Detection and Monitoring Biomedical Devices**
- 4-7-2: Surgical Assistive Devices**
- 4-7-3: Fluid and Microfluid Biomedical Devices**
- 4-7-4: Fluid and Microfluid Biomedical Devices**
- 4-8-1: Dynamics and Control of Biomechanical Systems I**
- 4-8-2: Dynamics and Control of Biomechanical Systems II**
- 4-8-3: Dynamics and Control of Biomechanical Systems III**
- 4-9-1: Clinical Applications of Bioengineering I – Experimental Methods**
- 4-9-2: Clinical Applications of Bioengineering II**
- 4-10-1: Biomedical Modeling I**
- 4-10-2: Biomedical Modeling II**
- 4-10-3: Biomedical Modeling III**
- 4-10-4: Biomedical Modeling IV**
- 4-10-5: Biomedical Modeling V**
- 4-11-2: Musculoskeletal Biomechanics**
- 4-11-3: Musculoskeletal and Sport Biomechanics**
- 4-14-1: Biotransport**
- 4-14-2: Heat Transfer and Fluid**

ACKNOWLEDGMENT

Track Organizers

Ahmed Al-Jumaily, *Auckland University of Technology, New Zealand*
 Sara Wilson, *University of Kansas, United States*
 Lulu Wang, *Hefei University of Technology, China*

Topic Organizers

Anil Saigal, *Tufts University, United States*
 Seyed Allameh, *Northern Kentucky Univ, United States*
 Karen Chang Yan, *College of New Jersey, United States*
 Xun Yu, *New York Institute of Technology, United States*
 Maurizio Manzo, *University of North Texas, United States*
 Shan Hu, *Iowa State University, United States*
 Mostafa Fatemi, *Mayo Clinic, United States*
 Assimina Pelegri, *Rutgers University, United States*
 Xiaoning Jiang, *NC State University, United States*
 Cahit A Evrensel, *Ankara University, Turkey*
 X. Gary Tan, *U.S. Naval Research Lab, United States*
 Douglas E. Dow, *Wentworth Institute of Technology, United States*
 Li-Hsin Han, *Drexel University, United States*

Linxia Gu, *University of Nebraska-Lincoln, United States*
 Shanzhong (Shawn) Duan, *Saint Martin's University, United States*
 Yi Hua, *University of Pittsburgh, United States*
 Reuben Kraft, *Pennsylvania State University, United States*
 Karim Muci-Kuchler, *South Dakota School of Mines and Technology, United States*
 Amit Bagchi, *U.S. Naval Research Laboratory, United States*
 Dumitru Caruntu, *University of Texas Rio Grande Valley, United States*
 Bogdan Epureanu, *University of Michigan, United States*
 Davide Piovesan, *Gannon University, United States*
 Yuan Feng, *Shanghai Jiao Tong University, China*
 Peyman Honarmandi, *Manhattan College, United States*
 Parisa Saboori, *Manhattan College, United States*
 Hai-Chao Han, *University of Texas at San Antonio, United States*
 Zhangli Peng, *University of Notre Dame, United States*
 Ahmed Al-Jumaily, *Auckland University of Technology, New Zealand*
 Toshihiko Shiraishi, *Yokohama National University, Japan*
 Takashi Saito, *Yamaguchi University, Japan*

Session Organizers

Anne Schmitz, *Gannon University, United States*
 Ashfaq Adnan, *University of Texas Arlington, United States*
 C.S. Florio, *US Army ARDEC, United States*
 Chao Liang, *Praxair, Inc., United States*
 Dan Wang, *Old Dominion University, United States*
 Junfei Tong, *University of Nebraska Lincoln, United States*
 Kalyani Nair, *Bradley University, United States*
 Liandong Yu, *Hefei University of Technology, China*
 Lara Thompson, *University of the District of Columbia, United States*
 Margaret Nowicki, *United States Military Academy, United States*
 Miri Weiss Cohen, *Braude College of Engineering, Israel*
 Ping Zhao, *Hefei University of Technology, China*
 Rika Carlsen, *Robert Morris University, United States*
 Sikhanda S. Satapathy, *ARL WMRD, United States*
 Souransu Nandi, *University of Buffalo, United States*

TRACK 4 BIOMEDICAL & BIOTECHNOLOGY ENGINEERING

WEDNESDAY, NOVEMBER 14

4-1 BIOMEDICAL AND BIOTECHNOLOGY PLENARY PRESENTATION

4-1-1 Biomedical and Biotechnology Plenary I

Third Floor, David L. Lawrence Convention Center, Room 303
9:00am–9:45am

9:00am – Acoustofluidics: Merging Acoustics and Microfluidics for Biomedical Applications

Plenary Presentation. IMECE2018-90094

Tony Jun Huang, *Duke University, Durham, NC, United States*

4-2 DAMAGE BIOMECHANICS

4-2-4 Damage Biomechanics IV: Cavitation as a Mechanism for Brain Injury

Third Floor, David L. Lawrence Convention Center, Room 309
10:00am–11:45am

Session Chair: Rika Carlsen, *Robert Morris University, Moon Township, PA, United States*

Session Co-Chair: X. Gary Tan, *U.S. Naval Research Lab, Washington, DC, United States*

10:00am – Cavitation Nucleation in Tissue Simulant Due to Mechanical Impact

Technical Presentation. IMECE2018-88941

Wonmo Kang, *U.S. Naval Research Laboratory, Washington, DC, United States*, Ashfaq Adnan, *University of Texas Arlington, Arlington, TX, United States*, Amit Bagchi, *U.S. Naval Research Laboratory, Washington, DC, United States*

10:15am – Acceleration-Induced Pressure Gradient and Cavitation in Soft Biomaterials During Mechanical Impact

Technical Presentation. IMECE2018-88942

Wonmo Kang, Marc Raphael, *U.S. Naval Research Laboratory, Washington, DC, United States*

10:30am – Computational Study of Cavitation Nucleation in Gelatin Due to Impact and Shock

Technical Presentation. IMECE2018-89828

Fuad Hasan, Siddarth Chintamani, Brian Dennis, *University of Texas at Arlington, Arlington, TX, United States*, Amit Bagchi, Thomas O'Shaughnessy, Wonmo Kang, *U.S. Naval Research Laboratory, Washington, DC, United States*, Ashfaq Adnan, *University of Texas Arlington, Arlington, TX, United States*

10:45am – Computational Study of Mild Traumatic Brain Injury Due to Shock Induced Bubble Dynamics in Viscoelastic Soft Tissues

Technical Presentation. IMECE2018-89820

Fuad Hasan, Yuan Ting Wu, Ashfaq Adnan, *University of Texas at Arlington, Arlington, TX, United States*

11:00am – Interfacial Shear Behavior of Collagen Triple Helix Bundle

Technical Presentation. IMECE2018-89989

Khandakar Mahmud, Yuan Ting Wu, Ashfaq Adnan, *University of Texas Arlington, Arlington, TX, United States*

4-8 DYNAMICS AND CONTROL OF BIOMECHANICAL SYSTEMS

4-8-1 Dynamics and Control of Biomechanical Systems I

Third Floor, David L. Lawrence Convention Center, Room 310
10:00am–11:45am

Session Chair: Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chairs: Bogdan Epureanu, *University of Michigan, Ann Arbor, MI, United States*, Davide Piovesan, *Gannon University, Erie, PA, United States*

10:00am – Virtual Interaction Between Patients and Occupational Therapists Using an Assistive Robotic Device With Cyber-Physical System

Technical Paper Publication. IMECE2018-87289

Marvin Cheng, *Embry-Riddle Aeronautical University, Morgantown, WV, United States*, Po-Lin Huang, Hao-Chuan Chu, Li-Han Peng, *National Tsing Hua University, Hsinchu, Taiwan*, Ezzat Bakhoum, *University of West Florida, Pensacola, FL, United States*

10:21am – Estimation of Hip and Ankle Visco-Elastic Parameters During Quiet Standing

Technical Paper Publication. IMECE2018-87585

Angel Cerda-Lugo, Alejandro González, *UASLP, San Luis Potosí, Mexico*, Antonio Cardenas, *UASLP, San Luis Potosí, Mexico*, Davide Piovesan, *Gannon University, Erie, PA, United States*

10:42am – Viscoelastic Characterization of Woven Dacron for Aortic Grafts by Using Direction-Dependent Quasi-Linear Viscoelasticity

Technical Paper Publication. IMECE2018-87806

Eleonora Tubaldi, *University of Arizona, Tucson, AZ, United States*, Giovanni Ferrari, Prabakaran Balasubramanian, Ivan Breslavskyi, Marco Amabili, *McGill University, Montreal, QC, Canada*

11:03am – 2-D Inverse Dynamics Knee Model: Aligning Anatomical Knee Model With Squatting Kinematic Data Using Ligament Forces

Technical Paper Publication. IMECE2018-88123

Jose M. Salinas, Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

11:24am – A Dynamic Escape Problem of Molecular Motors

Technical Paper Publication. IMECE2018-88612

Dean Culver, *Army Research Laboratory, Durham, NC, United States*, Bryan Glaz, *Army Research Laboratory, United States*, Samuel C. Stanton, *US Army Research Laboratory, Durham, NC, United States*

4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

4-10-1 Biomedical Modeling I

Third Floor, David L. Lawrence Convention Center, Room 311
10:00am–11:45am

Session Chair: Yi Hua, *University of Pittsburgh, Pittsburgh, PA, United States*

Session Co-Chair: Chao Liang, *Praxair, Inc., Tonawanda, NY, United States*

10:00am – Hydrodynamic Recruitment of Leukocytes Is Influenced by Adherent Cell Morphology

Technical Paper Publication. IMECE2018-86502
Dhananjay Subramaniam, *University of Cincinnati, Cincinnati, OH, United States*, David Gee, *Gannon University, Erie, PA, United States*

10:21am – Finite Element Modeling of Crimping and Sealing of Metallic Braided Stents for Endovascular Repair (EVAR)

Technical Presentation. IMECE2018-87025
Jayendiran Raja, *Texas A&M University, Doha, Doha, Qatar*, Annie Ruimi, *Texas A&M University at Qatar, College Station, TX, United States*, Bakr Nour, *Weill Cornell Medicine, Doha, Doha, Qatar*

10:42am – Degradation Modeling of Bioabsorbable Polymer Stent

Technical Paper Publication. IMECE2018-88116
Pengfei Dong, Longzhen Wang, Linxia Gu, *University of Nebraska–Lincoln, Lincoln, NE, United States*

11:03am – Multiscale and Multiphysics Modeling of Thrombus Biomechanics in Circulation

Technical Presentation. IMECE2018-88761
Alireza Yazdani, George Karniadakis, *Brown University, Providence, RI, United States*

11:24am – Numerical Study of Passive Micromixers for DNA Analysis

Technical Presentation. IMECE2018-89133
Ritesh Agarwal, Tarek Abdel-Salam, Stephanie George, *East Carolina University, Greenville, NC, United States*

4-11 MUSCULOSKELETAL AND SPORTS BIOMECHANICS

4-11-1 Sports Related Brain Injury and Modeling

Third Floor, David L. Lawrence Convention Center, Room 315
10:00am–11:45am

Session Chair: Yuan Feng, *Shanghai Jiao Tong University, Shanghai, China*

Session Co-Chair: Parisa Saboori, *Manhattan College, Riverdale, NY, United States*

10:00am – Development of a Low-Cost Mechanical Model of a Human Head

Technical Paper Publication. IMECE2018-87129
Grace Foltz, Elizabeth Tillotson, Beth Todd, *University of Alabama, Tuscaloosa, AL, United States*

10:21am – Study of Head Concussions on Female Soccer Players

Technical Paper Publication. IMECE2018-88347
Peyman Honarmandi, Alessandra Palmisano, *Manhattan College, Riverdale, NY, United States*, Iryna Stashuk, *City College of New York, New York, NY, United States*, Shawn Ladda, *Manhattan College, Riverdale, NY, United States*

10:42am – Neck Loading Model of a Child in a Car Seat

Technical Paper Publication. IMECE2018-88363
Parisa Saboori, Gregory Bohn, Caitlin Hall, Kathia Coronado, Veronica Valerio, *Manhattan College, Riverdale, NY, United States*

11:03am – A New Scaling Relationship Between Human and Mouse Brain to Study Concussion

Technical Presentation. IMECE2018-90033
Haojie Mao, *Western University, Detroit, MI, United States*, Lihong Lu, Kewei Bian, *Western University, London, ON, Canada*

11:24am – Age Related Brain Atrophy and Vulnerability to TBI

Technical Presentation. IMECE2018-87498
Arpad Bakonyi, Alan Fajtelewicz, Siavash Hashemi, Shahab Mansoorbaghaei, *City College of New York, New York, NY, United States*, Ali Sadegh, *City University of New York, New York, NY, United States*

4-3 VIBRATION AND ACOUSTICS IN BIOMEDICAL APPLICATIONS

4-3-1 Vibration Characteristics and Characterisations

Third Floor, David L. Lawrence Convention Center, Room 309
1:45pm–3:30pm

Session Chair: Ping Zhao, *Hefei University of Technology, Hefei, China*

Session Co-Chair: Toshihiko Shiraishi, *Yokohama National University, Yokohama, Japan*

1:45pm – Acoustic Radiation of Axially Stepped-Thickness Piezoelectric Cylindrical Shells

Technical Paper Publication. IMECE2018-86306
Ata Meshkinzar, Ahmed M. Al-Jumaily, *Auckland University of Technology, Auckland, New Zealand*

2:06pm – Investigation of the Scattering of Focused Ultrasonic Waves at Bones

Technical Paper Publication. IMECE2018-87133
Christoph Schaal, Vibhav Durgesh, *California State University, Northridge, CA, United States*

2:27pm – Influence of Brain Cooling on Frequency Characteristics of the Epileptic Focus and Its Surrounding Area

Technical Paper Publication. IMECE2018-87288
Saya Kumano, *Yamaguchi University*
Saito, *Yamagu*
Uehara, Y

Takashi
Kenyu

2:48pm – Determination of Mechanical Properties of Human Skull With Modal Analysis

Technical Paper Publication. IMECE2018-88103
Ashkan Eslaminejad, Mohammad Hosseini Farid, Mohammadreza Ramzanpour, Mariusz Ziejewski, Ghodrat Karami, North Dakota State University, Fargo, ND, United States

4-8 DYNAMICS AND CONTROL OF BIOMECHANICAL SYSTEMS

4-8-2 Dynamics and Control of Biomechanical Systems II

Third Floor, David L. Lawrence Convention Center, Room 310
1:45pm–3:30pm

Session Chair: Davide Piovesan, Gannon University, Erie, PA, United States

Session Co-Chairs: Dumitru Caruntu, University of Texas Rio Grande Valley, Edinburg, TX, United States, Bogdan Epureanu, University of Michigan, Ann Arbor, MI, United States

1:45pm – Develop a Flexible Regenerative Exoskeleton to Assist Walking

Technical Paper Publication. IMECE2018-86779
Longhan Xie, Xiaodong Li, South China University of Technology, Guangzhou, China

2:06pm – Is Linear Camera Space Manipulation Impervious to Systematic Distortions?

Technical Paper Publication. IMECE2018-87645
Felipe Martinez, UASLP, San Luis Potosi, Mexico, Adam Mihalko, Lillian Blum, Gannon University, Erie, PA, United States, Antonio Cardenas, UASLP, San Luis Potosi, Mexico, Davide Piovesan, Gannon University, Erie, PA, United States

2:27pm – Robust and Iterative Learning Control of Agonist/Antagonist Pair

Technical Presentation. IMECE2018-87939
Patrick J. Schimoler, Allegheny General Hospital, Pittsburgh, PA, United States, Jeffrey S. Viperman, University of Pittsburgh, Pittsburgh, PA, United States, Mark Carl Miller, Allegheny General Hospital, Pittsburgh, PA, United States

2:48pm – Design of Robotic System for Cognitive Rehabilitation Based on Machine Vision

Technical Presentation. IMECE2018-88909
Haodong Chen, Ping Zhao, Kangren Zhao, Wenxiu Chen, Hefei University of Technology, Hefei, Anhui, China

3:09pm – Design and Evaluation of Controllers for an Elastically Strapped Lower Extremity Exoskeleton

Technical Presentation. IMECE2018-89965
Xianlian Zhou, New Jersey Institute of Technology, Newark, NJ, United States, Xinyu Chen, CFD Research Corporation, Huntsville, AL, United States

4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

4-10-2 Biomedical Modeling II

Third Floor, David L. Lawrence Convention Center, Room 311
1:45pm–3:30pm

Session Chair: Yi Hua, University of Pittsburgh, Pittsburgh, PA, United States

Session Co-Chair: Chao Liang, Praxair, Inc., Tonawanda, NY, United States

1:45pm – Evaluation of Soft Material Fracture Behavior via Indentation Testing With a Needle-Like Indenter

Technical Paper Publication. IMECE2018-87199
Takayuki Ishino, Atsushi Sakuma, Kyoto Institute of Technology, Kyoto, Japan

2:06pm – Validation of a Finite Element Model of the Mechanical Performance of Surgical Knots of Varying Topology

Technical Paper Publication. IMECE2018-87868
Arz Y. Qwam Alden, Andrew G. Geeslin, Peter A. Gustafson, Western Michigan University, Kalamazoo, MI, United States

2:27pm – The Influence of Primary Blast Wave on the Posterior Part of the Eyeball

Technical Paper Publication. IMECE2018-88113
Junfei Tong, Linxia Gu, University of Nebraska–Lincoln, Lincoln, NE, United States

2:48pm – A Computational Model of Continuous Hollow Cerebrovascular Arterioles Using a Fractal L-System

Technical Paper Publication. IMECE2018-88511
Nicolas Cuitino, Rutgers University, Piscataway, NJ, United States, Assimina Pelegri, Rutgers University, East Brunswick, NJ, United States, Benjamin Johannesson, Boyce Technologies, Long Island City, NJ, United States

3:09pm – A Machine Learning Approach for Intraoperative Reconstruction of Soft Tissue

Technical Presentation. IMECE2018-89929
Ye Han, Qi Wang, Yoed Rabin, Levent Burak Kara, Carnegie Mellon University, Pittsburgh, PA, United States

4-11 MUSCULOSKELETAL AND SPORTS BIOMECHANICS

4-11-2 Musculoskeletal Biomechanics

Third Floor, David L. Lawrence Convention Center, Room 315
1:45pm–3:30pm

Session Chair: Peyman Honarmandi, *Manhattan College, Riverdale, NY, United States*

Session Co-Chair: Yuan Feng, *Shanghai Jiao Tong University, Shanghai, China*

1:45pm – Evaluation of ACL Insertion Site Load Transmission

Technical Presentation. IMECE2018-86829
Michael Smolinski, Brandon Marshall, Monica Linde, Freddie H. Fu, Patrick Smolinski, William Slaughter, *University of Pittsburgh, Pittsburgh, PA, United States*

2:06pm – Prophylactic Brace Design to Prevent ACL Injuries

Technical Presentation. IMECE2018-88393
Gregory Bohn, Parisa Saboori, *Manhattan College, Riverdale, NY, United States*, Lorraine Piccorelli, *Manhattan College, Bronx, NY, United States*

2:27pm – ACL Graft Position in the Tunnel

Technical Presentation. IMECE2018-86835
Junjun Zhu, Brandon Marshall, Xin Tang, Weimin Zhu, Michael Smolinski, Joon Ho Wang, Monica Linde, Freddie H. Fu, Patrick Smolinski, *University of Pittsburgh, Pittsburgh, PA, United States*

2:48pm – A Misoriented Biceps Tendon Repair Has No Effect on Strength

Technical Presentation. IMECE2018-87415
Sean Delserso, *University of Pittsburgh, Pittsburgh, PA, United States*, Tyler Madonna, *Rehab Neural Engineering Labs, Pittsburgh, PA, United States*, Stephen Liu, *Penn Orthopaedics, Exton, PA, United States*, Michael Smolinski, *University of Pittsburgh, Pittsburgh, PA, United States*, Joseph Styron, *Cleveland Clinic, Cleveland, OH, United States*, Nicholas Vaudreuil, Brandon Brown, Patrick Smolinski, Mark Miller, *University of Pittsburgh, Pittsburgh, PA, United States*, Christopher Schmidt, *Orthopaedic Specialists, Pittsburgh, PA, United States*

3:09pm – Assessing Non-Uniform Stiffening of the Achilles Tendon Noninvasively Using Surface Wave Elastography

Technical Presentation. IMECE2018-89879
Muhammad Salman, *Kennesaw State University, Marietta, GA, United States*, Karim Sabra, *Georgia Institute of Technology, Marietta, GA, United States*

4-3 VIBRATION AND ACOUSTICS IN BIOMEDICAL APPLICATIONS

4-3-2 Vibration Applications to Therapy and Rehabilitation

Third Floor, David L. Lawrence Convention Center, Room 309
3:45pm–5:30pm

Session Chair: Takashi Saito, *Yamaguchi University, Ube/Yamaguchi, Japan*

Session Co-Chair: Toshihiko Shiraishi, *Yokohama National University, Yokohama, Japan*

3:45pm – Design of Planar 1-DOF Rehabilitation Mechanisms via Kinematic-Mapping Motion Synthesis Framework

Technical Presentation. IMECE2018-88785
Ping Zhao, Kangren Zhao, Wenxiu Chen, Haodong Chen, *Hefei University of Technology, Hefei, China*

4:06pm – Fluid Impact Under Various Tapping Conditions for Biomedical Application (Shirodhara)

Technical Paper Publication. IMECE2018-87341
Swathika M., Lakshmana Rao C., Balasubramanian Venkatesh, *Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*

4:27pm – A Study of a Mechanism of Cell Proliferation Promotion of Cultured Osteoblasts by Mechanical Vibration

Technical Paper Publication. IMECE2018-87364
Toshihiko Shiraishi, Akitoshi Nishijima, *Yokohama National University, Yokohama, Japan*

4:48pm – Experimental Identification of Model Parameters and the Statistical Processing Using a Nonlinear Oscillator Applied to EEG Analysis

Technical Paper Publication. IMECE2018-88112
Kenyu Uehara, *Yamaguchi University, Ube, Japan*, Takashi Saito, *Yamaguchi University, Ube/Yamaguchi, Japan*

4-4 BIOMEDICAL IMAGING AND TISSUE CHARACTERIZATION

4-4-1 Tissue Characterisations

Third Floor, David L. Lawrence Convention Center, Room 308
3:45pm–5:30pm

Session Chair: Margaret Nowicki, *United States Military Academy, West Point, NY, United States*

Session Co-Chair: Xiaoning Jiang, *NC State University, Raleigh, NC, United States*

3:45pm – Relating Bone Intra-Cortical Elastic Stiffness to EDX Spectroscopy Mineralization Measurements

Technical Paper Publication. IMECE2018-86233
Ilige Hage, Remi Hage, *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, Charbel Seif, *American University of Beirut, Beirut, Lebanon*, Ramsey Hamade, *American University of Beirut, Beirut, Riad El Solh, Lebanon*

4:06pm – Human Mandibular Bone Density Distribution: Image Analysis and Patient-Specific Bone Remodeling Simulation

Technical Presentation. IMECE2018-86866

Kangning Su, Kayla Reigh, Pennsylvania State University, State College, PA, United States, **Li Yuan**, Shenzhen People's Hospital, 2nd Clinical Medical College of Jinan University, Shen Zhen, China, **Jie Yang**, Temple University, Philadelphia, PA, United States, **Jing Du**, Pennsylvania State University, State College, PA, United States

4:27pm – A Modular Test Platform for Micromechanical Tensile Testing of Soft Biomaterials

Technical Paper Publication. IMECE2018-87259

Wilson Eng, Max Kim, Anand Ramasubramanian, Sang-Joon (John) Lee, San Jose State University, San Jose, CA, United States

4:48pm – Compliance Effect on the Flow Condition in Vascular In Vitro Experiments

Technical Paper Publication. IMECE2018-87362

Masami Matsuura, Simon Tupin, Makoto Ohta, Tohoku University, Sendai, Miyagi, Japan

5:09pm – Temporal Evolution of Abdominal Aortic Wall Stress Using Image-Based Vascular Mechanical Characterization (iV-MeCh) Technique

Technical Presentation. IMECE2018-88275

Prahlad Menon, University of Pittsburgh, Pittsburgh, PA, United States, **Mirunalini. Thirugnanasambandam**, University of Texas at San Antonio, San Antonio, TX, United States, **Stephane Avril**, Ecole Nationale Supérieure Des Mines, Saint-Etienne, France, **Ender Finol, Senol Piskin, Tejas Canchi**, University of Texas at San Antonio, San Antonio, TX, United States, **Christof Karmonik**, The Methodist Hospital, Houston, TX, United States, **Soroosh Sanatkhani**, University of Pittsburgh, Pittsburgh, PA, United States

4-8 DYNAMICS AND CONTROL OF BIOMECHANICAL SYSTEMS

4-8-3 Dynamics and Control of Biomechanical Systems III

Third Floor, David L. Lawrence Convention Center, Room 310
3:45pm–5:30pm

Session Chair: Dumitru Caruntu, University of Texas Rio Grande Valley, Edinburg, TX, United States

Session Co-Chairs: Davide Piovesan, Gannon University, Erie, PA, United States, Souransu Nandi, University at Buffalo, State University of New York, Buffalo, NY, United States, Dan Wang, Old Dominion University, Norfolk, VA, United States

3:45pm – Arterial Wall Motion and its Dynamic Modeling for Arterial Stiffness and Damping

Technical Paper Publication. IMECE2018-86883

Dan Wang, Linda Vahala, Thomas Alberts, Old Dominion University, Norfolk, VA, United States, **Zhili Hao**, Old Dominion University, Virginia Beach, VA, United States

4:06pm – Material and Posture Modeling for Sleeping on Soft Low-Density Porous Material

Technical Paper Publication. IMECE2018-87249

Takahiro Yamaguchi, Hajime Kimura, Atsushi Sakuma, Kyoto Institute of Technology, Kyoto, Japan, **Kazushige Takahashi, Shigetoshi Mimura**, Toyo Quality One Corporation, Kawagoe, Japan

4:27pm – Hypo/Hyperglycemic Constrained Design of IV Insulin Control for Type 1 Diabetic Patients With Meal and Initial Condition Uncertainties Using Sequential Quadratic Programming

Technical Paper Publication. IMECE2018-87742

Souransu Nandi, Tarunraj Singh, University at Buffalo, State University of New York, Buffalo, NY, United States

4:48pm – Chance Constraint Based Design of IV Insulin Control for Type 1 Diabetic Patients Under Model and Meal Uncertainties

Technical Paper Publication. IMECE2018-87759

Souransu Nandi, Tarunraj Singh, University at Buffalo, State University of New York, Buffalo, NY, United States

4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

4-10-3 Biomedical Modeling III

Third Floor, David L. Lawrence Convention Center, Room 311
3:45pm–5:30pm

Session Chair: Junfei Tong, University of Nebraska–Lincoln, Lincoln, NE, United States

Session Co-Chair: Chao Liang, Praxair, Inc., Tonawanda, NY, United States

3:45pm – Fluid-Structure Interaction of Blood Flow in Human Aorta Under Dynamic Conditions: A Numerical Approach

Technical Paper Publication. IMECE2018-87793

Massimo Milani, Francesca Martelli, Luca Montorsi, University of Modena and Reggio Emilia, Reggio Emilia, Italy, **Guido Ligabue, Pietro Torricelli**, University of Modena and Reggio Emilia, Modena, Italy

4:06pm – Reconstruction of Swirling Blood Flow in the Heart and Aorta on the Basis of Measurements of Dynamic Geometry and Elastic Properties of the Flow Channel

Technical Paper Publication. IMECE2018-87680

Eugeniy Talygin, Shota Zhorzholiani, Marina Tkhagapsova, Yuriy Tsygankov, Andrey Agafonov, Alexander Gorodkov, Gennadiy Kiknadze, Leo Bockeria, Bakulev Research Center for Cardiovascular Surgery, Moscow, Russia

4:27pm – Virtual Septoplasty Using Computational Fluid Dynamics

Technical Presentation. IMECE2018-88153

Masoud Ghorbani Moghaddam, Medical College of Wisconsin, Milwaukee, WI, United States, **Julia S. Kimbell**, University of North Carolina, Chapel Hill, NC, United States, **Dennis O. Frank-Ito**, Duke University States, **John S. Rhee, Guilherme J.M. Garcia**, Medical

4:48pm – Comparison of Ablation Volume Produced With Multi-Tine Dry Type and Wet Type Electrodes During Radio Frequency Ablation: An In Vitro Study

Technical Paper Publication. IMECE2018-88588

Sundeeep Singh, Ramjee Repaka, *Indian Institute of Technology Ropar, Rupnagar, Punjab, India*

5:09pm – Spatiotemporal Organization of Excitation and Mechanical Waves During Life-Threatening Re-Entrant Cardiac Arrhythmias

Technical Presentation. IMECE2018-89458

Amirhossein Molavi Tabrizi, Ata Mesgarnejad, *Northeastern University, Boston, MA, United States*, Jan Christoph, Stephan Luther, *Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany*, Maher N. Bazzi, *University of Kansas School of Medicine-Wichita, Wichita, KS, United States*, Alain Karma, *Northeastern University, Boston, MA, United States*

5:09pm – Gait Analysis for Muscular Forces Evaluation in Human Movement: Integration Protocol of Typical Measurement Methods

Technical Paper Publication. IMECE2018-87670

Massimo Milani, Luca Fontanili, Luca Montorsi, *University of Modena and Reggio Emilia, Reggio Emilia, Italy*, Giordano Valente, *Medical Technology Laboratory, Rizzoli Orthopaedic Institute, Bologna, Italy*

4-11 MUSCULOSKELETAL AND SPORTS BIOMECHANICS

4-11-3 Musculoskeletal and Sport Biomechanics

Third Floor, David L. Lawrence Convention Center, Room 315
3:45pm–5:30pm

Session Chair: Parisa Saboori, *Manhattan College, Riverdale, NY, United States*

Session Co-Chair: Peyman Honarmandi, *Manhattan College, Riverdale, NY, United States*

3:45pm – Anterior Cruciate Ligament Graft-Tunnel Relative Motion

Technical Presentation. IMECE2018-86816

Junjun Zhu, Brandon Marshall, Xin Tang, Weimin Zhu, Michael Smolinski, Monica Linde, Joon Ho Wang, Freddie H. Fu, Patrick Smolinski, *University of Pittsburgh, Pittsburgh, PA, United States*

4:06pm – Finite Element Analysis of Dynamics of Human Muscle Compressed by Fabric Sleeve

Technical Paper Publication. IMECE2018-87304

Shodai Ueda, Atsushi Sakuma, *Kyoto Institute of Technology, Kyoto, Japan*

4:27pm – Assessment of Muscle Stiffness while Using Single Axis Accelerometers

Technical Presentation. IMECE2018-89728

Carlos Munoz, Muhammad Salman, *Kennesaw State University, Marietta, GA, United States*

4:48pm – Computational Prediction of Neck Musculoskeletal Loading in Walking and Running with Head Supported Mass

Technical Presentation. IMECE2018-89808

Xianlian Zhou, *New Jersey Institute of Technology, Newark, NJ, United States*, Xinyu Chen, Paulien Roos, Phillip Whitley, *CFD Research Corporation, Huntsville, AL, United States*

THURSDAY, NOVEMBER 15

4-1 BIOMEDICAL AND BIOTECHNOLOGY PLENARY PRESENTATION

4-1-2 Biomedical and Biotechnology Plenary II

Third Floor, David L. Lawrence Convention Center, Room 304
8:00am–8:45am

8:00am – New Directions in Medical Ultrasound

Plenary Presentation. IMECE2018-90095

Mostafa Fatemi, *Mayo Clinic, Rochester, MN, United States*

4-4 BIOMEDICAL IMAGING AND TISSUE CHARACTERIZATION

4-4-2 Biomedical Imaging and Characterization

Third Floor, David L. Lawrence Convention Center, Room 308
8:55am–10:40am

Session Chair: Mostafa Fatemi, *Mayo Clinic, Rochester, MN, United States*

Session Co-Chair: Assimina Pelegri, *Rutgers University, East Brunswick, NJ, United States*

8:55am – Analysis of High Frequency Ultrasound Power Spectrum Peak Density for Detecting Soft Tissue Microstructure/Pathology

Technical Presentation. IMECE2018-86568

Jeremy Stromer, *University of Connecticut, Storrs, CT, United States*, Koushik Paul, Jorge Fernandez Losada, Leila Ladani, *University of Texas at Arlington, Arlington, TX, United States*

9:10am – Deep Convolutional Neural Networks for Breast Image Analysis on Holographic Microwave Imaging

Technical Paper Publication. IMECE2018-86765

Lulu Wang, Jinzhang Xu, *Hefei University of Technology, Hefei, China*

9:25am – Investigating the Progression of Alzheimer's Disease Using Digital Volume Correlation Algorithm and Strain as a Metric

Technical Paper Publication. IMECE2018-87563

Annastacia McCarty, Sarah Bentil, *Iowa State University, Ames, IA, United States*

9:40am – Temporal Evolution of the Walls of Elastase-Induced Rabbit Aneurysms

Technical Presentation. IMECE2018-88290

Chao Sang, *University of Pittsburgh, Pittsburgh, PA, United States*, David F. Kallmes, *Mayo Clinic, Rochester, MN, United States*, Simon C. Watkins, Anne M. Robertson, *University of Pittsburgh, Pittsburgh, PA, United States*

9:55am – A Computational Simulation of Brain White Matter Accounting for Structural Anisotropy in Frequency Domain

Technical Presentation. IMECE2018-88488

Xuehai Wu, Daniel Sullivan, *Rutgers University, Piscataway, NJ, United States*, John Georgiadis, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Assimina Pelegri, *Rutgers University, East Brunswick, NJ, United States*

10:10am – Optical Microlaser Sensing Devices for Brain Activity Monitoring

Technical Presentation. IMECE2018-89316

Maurizio Manzo, *University of North Texas, Denton, TX, United States*

4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION

4-5-1 Biomaterials and Tissue I: Fabrication

Third Floor, David L. Lawrence Convention Center, Room 309
8:55am–10:40am

Session Chair: Anil Saigal, *Tufts University, Medford, MA, United States*

Session Co-Chair: Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*

8:55am – Stretch-and-Folding Method to Mass Produce Biomedical Nanofibers

Technical Presentation. IMECE2018-87975

Mingkun Wang, Lanziye He, Chunxiao Cui, Li-Hsin Han, *Drexel University, Philadelphia, PA, United States*

9:16am – Effect of Laser Texturing and Plasma Nitriding on Titanium

Technical Presentation. IMECE2018-89446

Mohammad Hossan, Morshed Khandaker, *University of Central Oklahoma, Edmond, OK, United States*

9:37am – In Situ Contactless 3D Printing of Cellular Structures

Technical Presentation. IMECE2018-89651

Sarah Mishriki, Abdel Rahman Abdel Fattah, Elvira Meleca, *McMaster University, Hamilton, ON, Canada*, Tobias Kammann, *Friedrich Schiller University Jena, Jena, Germany*, Rakesh Sahu, Fei Geng, Ishwar K. Puri, *McMaster University, Hamilton, ON, Canada*

9:58am – Biofabrication of Zonally-Stratified Construct for Cartilage Repair

Technical Presentation. IMECE2018-89682

Yang Wu, *Pennsylvania State University, State College, PA, United States*, Aman Dhawan, *Pennsylvania State University, Hershey, PA, United States*, Ibrahim Ozbolat, *Pennsylvania State University, University Park, PA, United States*

10:19am – A New Aspiration-Assisted Bioprinting Technique for Tissue Biofabrication

Technical Presentation. IMECE2018-89799

Bugra Ayan, Dong Nyoung Heo, Madhuri Dey, Adomas Pavilianskas, Zhifeng Zhang, Mecit Altan Alioglu, Corina S. Drapaca, Ibrahim Ozbolat, *Pennsylvania State University, University Park, PA, United States*

4-7 BIOMEDICAL DEVICES

4-7-1 Detection and Monitoring Biomedical Devices

Third Floor, David L. Lawrence Convention Center, Room 310
8:55am–10:40am

Session Chair: Margaret Nowicki, *United States Military Academy, West Point, NY, United States*

Session Co-Chair: Chao Liang, *Praxair, Inc., Tonawanda, NY, United States*

8:55am – Design and Validation of a Low-Cost Non-Invasive Device to Detect Overnight Hypoglycemia

Technical Paper Publication. IMECE2018-86009

Jonathan Lesko, Stephen Seibert, Yong Zhu, *Wilkes University, Wilkes-Barre, PA, United States*

9:16am – Design and Validation of a Low-Cost Heart Health Monitoring Device

Technical Paper Publication. IMECE2018-86031

Nuzhat Ahmed, Lucas Kline, Yong Zhu, *Wilkes University, Wilkes-Barre, PA, United States*

9:37am – A Numerical Study of the Influence of Different Factors on Mechanical Characterization of Tumors via a 2D Tactile Sensor

Technical Paper Publication. IMECE2018-87669

Zhili Hao, Cristina Genoese-Zerbi, *Old Dominion University, Virginia Beach, VA, United States*, James Jobe, *Old Dominion University, Williamsburg, VA, United States*, Kylee Kohl, *Old Dominion University, Virginia Beach, VA, United States*, Nathan Abshier, Timothy Watjen, *Old Dominion University, Norfolk, VA, United States*, Charles Tison, *Old Dominion University, Virginia Beach, VA, United States*

9:58am – Smartphone-Based Device for Monitoring Chemical Pollutants in Water

Technical Paper Publication. IMECE2018-86893

Samuel Ozeh, *Purdue University Northwest, Hammond, IN, United States*, A. G. Agwu Nnanna, *University of Texas of the Permian Basin, Odessa, TX, United States*, Justus C. Ndukaife, *Vanderbilt University, Nashville, TN, United States*

10:19am – A Small Radio Frequency Sensor for Microwave Tumor Ablation

Technical Paper Publication. IMECE2018-86766

Lulu Wang, *Hefei University of Technology, Hefei, China*, Mengke Ge, Bensheng Qiu, *University of Science and Technology of China, Hefei, China*

4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

4-10-4 Biomedical Modeling IV

Third Floor, David L. Lawrence Convention Center, Room 311
8:55am–10:40am

Session Chair: Shanzhong (Shawn) Duan, *Saint Martin's University, Lacey, WA, United States*

Session Co-Chair: Chao Liang, *Praxair, Inc., Tonawanda, NY, United States*

8:55am – Monte Carlo Simulation of the Laser-Induced Temperature Dynamics in Very Thin Scattering and Absorbing Biological Layer Piles

Technical Paper Publication. IMECE2018-86545

Reginald Eze, *City University of New York, Long Island City, NY, United States*

9:10am – Patellofemoral Pain Syndrome: Sensitivity Analysis of Muscle Parameters for Expedited Recovery Utilizing an OpenSim Model for Lower Extremities

Technical Paper Publication. IMECE2018-87042

Adam Novotny, Manish Paliwal, *The College of New Jersey, Ewing, NJ, United States*

9:25am – Computational Modeling of Coagulopathy for Decision Support

Technical Paper Publication. IMECE2018-87683

Brandon Saltsman, Carey Balaban, Jeffrey S. Viperman, *University of Pittsburgh, Pittsburgh, PA, United States*

9:40am – A Stochastic Finite Element Method for Simulating Trabecular Bone

Technical Paper Publication. IMECE2018-87869

Saif Alrafeek, James R. Jastifer, Peter A. Gustafson, *Western Michigan University, Kalamazoo, MI, United States*

9:55am – A Biomechanical and Thermal Analysis for Bone Augmentation of the Proximal Femur

Technical Paper Publication. IMECE2018-88583

Amirhossein Farvardin, Mahsan Bakhtiarinejad, Michael Pozin, Mehran Armand, *Johns Hopkin University, Baltimore, MD, United States*

10:10am – Thermal Analysis of Marginal Conditions to Facilitate Cryopreservation by Vitrification

Technical Presentation. IMECE2018-89607

Purva Joshi, Yoed Rabin, *Carnegie Mellon University, Pittsburgh, PA, United States*

4-14 BIOTRANSPORT (FLUID, HEAT AND MASS)

4-14-1 Biotransport

Third Floor, David L. Lawrence Convention Center, Room 315
8:55am–10:40am

Session Chair: Anne Schmitz, *Gannon University, Erie, PA, United States*

Session Co-Chair: Cahit A. Evrensel, *Ankara University, Ankara, Turkey*

8:55am – Efficient Uncertainty Quantification for Biotransport in Tumors With Uncertain Material Properties

Technical Paper Publication. IMECE2018-86216

Alen Alexanderian, William Reese, Ralph C. Smith, *North Carolina State University, Raleigh, NC, United States,*
Meilin Yu, *University of Maryland Baltimore County, Baltimore, MD, United States*

9:16am – Influence of Non-Newtonian Rheology on Mass Transfer From a Biofluid in Separated and Reattached Flows

Technical Paper Publication. IMECE2018-86809

Khaled J. Hammad, *Central Connecticut State University, Simsbury, CT, United States*

9:37am – CFD Model of White Thrombus Formation by High Shear Blood Flows With Consideration of Transport Process of Concentration and Aggregation Process, and Related Thrombus Visualization

Technical Presentation. IMECE2018-88379

Masaaki Tamagawa, *Kyushu Institute of Technology, Kitakyushu, Japan*

9:58am – Optimum Frequency Range for Enhancing Cough Clearance Through Flow Oscillations

Technical Presentation. IMECE2018-89987

Duygu L. Tuna, Altay Ünal, Fikret Ari, *Ankara University, Ankara, Turkey,* **Peter Krumpel,** *University of Nevada, Reno, NV, United States,* **Cahit A. Evrensel,** *Ankara University, Ankara, Turkey*

10:19am – Eletrokinetic Remediation of Contaminated Soils With Chromium

Technical Paper Publication. IMECE2018-87552

André Ribeiro, Jorge Araújo, *CVR—Centro para a Valorização de Resíduos, Guimarães, Portugal,* **Cândida Vilarinho, Joana Carvalho,** *University of Minho, Guimarães, Portugal*

4-2 DAMAGE BIOMECHANICS

4-2-3 Damage Biomechanics III: Materials Characterization, Modeling and Analysis

Third Floor, David L. Lawrence Convention Center, Room 308
10:50am–12:35pm

Session Chair: Sikhanda S Satapathy, *ARL WMRD, APG, MD, United States*

Session Co-Chair: Karim Muci-Kuchler, *South Dakota School of Mines and Technology, Rapid City, SD, United States*

10:50am – Brain Tissue Material and Damage Properties for Blast Trauma

Technical Paper Publication. IMECE2018-88419

Soroush Assari, Kurosh Darvish, *Temple University, Philadelphia, PA, United States*

11:05am – Characterization of Injured Brain Tissue After Controlled Cortical Impact (CCI) Using a Mouse Model

Technical Presentation. IMECE2018-86109

Suhao Qiu, *Shanghai Jiao Tong University, Shanghai, China,* **Wei Chen, Shanshan Qiu, Jianfeng Zeng, Mingyuan Gao, Luyang Tao,** *Soochow University, Suzhou, China,* **Ankush Aggarwal,** *Swansea University, Swansea, United Kingdom,* **Chung-Hao Lee,** *University of Oklahoma, Norman, OK, United States,* **Yuan Feng,** *Shanghai Jiao Tong University, Shanghai, China*

11:20am – A Comparison of Neuronal Membrane Mechanoporation Strain Behavior for

Dilauroylphosphatidylcholine (DLPC) and 1-Palmitoyl-2-Oleoylphosphatidylcholine (POPC) Phospholipids

Technical Presentation. IMECE2018-89831

Folly Crawford, Michael Murphy, *Mississippi State University, Starkville, MS, United States,* **S. Mun,** *Mississippi State University, Mississippi State, MS, United States,* **R.K. Prabhu,** *Mississippi State University, Starkville, MS, United States*

11:35am – Failure and Damage of Mineralized Tissue Under Tension

Technical Presentation. IMECE2018-89207

Rizacan Sarikaya, Anil Misra, *University of Kansas, Lawrence, KS, United States*

11:50am – A Non-Linear Multi-Axial Fatigue Damage Model for the Intervertebral Disc Annulus

Technical Presentation. IMECE2018-89755

Adhitya Vikraman Subramani, *Pennsylvania State University, University Park, PA, United States,* **Shruti Motiwale,** *Tesla Motors, Palo Alto, CA, United States,* **Xianlian Zhou,** *CFDRC, Huntsville, AL, United States,* **Reuben Kraft,** *Pennsylvania State University, University Park, PA, United States*

12:05pm – Towards a Better Understanding of Optic Nerve Biomechanics Using a Multimaterial Finite Element Model

Technical Presentation. IMECE2018-89874

Rika Carlsen, *Robert Morris University, Moon Township, PA, United States,* **Anirban Jana,** *Pittsburgh Center, Carnegie Mellon University, Pittsburgh, PA, United States*

4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION

4-5-2 Biomaterials and Tissue II: Modelling

Third Floor, David L. Lawrence Convention Center, Room 309
10:50am–12:35pm

Session Chair: Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*

Session Co-Chair: Karen Chang Yan, *The College of New Jersey, Ewing Township, NJ, United States*

10:50am – Cellular Automaton and Finite Element Hybrid Simulation to Predict Axonal Extension Enhancement of Nerve Cell Under Mechanical Stimulation

Technical Paper Publication. IMECE2018-86653
Shota Takeda, Yoshihiro Tomita, Eiji Nakamachi, *Doshisha University, Kyotanabe, Kyoto, Japan*

11:11am – Some Considerations for Hyperelastic Modeling of the Brain Tissue

Technical Presentation. IMECE2018-87072
Aref Samadi-Dooki, George Voyiadjis, *Louisiana State University, Baton Rouge, LA, United States*

11:32am – On Continuum Based Multiscale Modelling of Engineered Soft Tissue Constructs

Technical Paper Publication. IMECE2018-88482
Karen Chang Yan, *The College of New Jersey, Ewing Township, NJ, United States*, Jacob Bennedsen, *The College of New Jersey, Lebanon, NJ, United States*

11:53am – Brazier Buckling in Grain Stems: Modeling and Understanding the Role of Functional Grading and Other Structural Characteristics

Technical Presentation. IMECE2018-89062
Christopher Stubbs, *New York University, Brooklyn, NY, United States*, Wenhuan Sun, *Carnegie Mellon University, Pittsburgh, PA, United States*, Douglas D. Cook, *Brigham Young University, Provo, UT, United States*

12:14pm – Nonlinear Contact Mechanics for the Indentation of Cellular Cylindrical Bodies

Technical Presentation. IMECE2018-89082
Amy Dagro, K.T. Ramesh, *Johns Hopkins University, Baltimore, MD, United States*

4-7 BIOMEDICAL DEVICES

4-7-2 Surgical Assistive Devices

Third Floor, David L. Lawrence Convention Center, Room 310
10:50am–12:35pm

Session Chair: Lulu Wang, *Hefei University of Technology, Hefei, China*

Session Co-Chair: Maurizio Manzo, *University of North Texas, Denton, TX, United States*

10:50am – Pre-Surgical Planning of Screw-Position Arrangement for the Femur Fractures With a Custom APP Technical Paper Publication. IMECE2018-86013

Chen-Yuan Chung, Jiing-Yih Lai, He-Kai Young, Han-Yuan Gao, *National Central University, Taoyuan City, Taiwan*

11:11am – Biomedical Devices Using Shape Memory Polymer Foams for Treatment of Intracranial Aneurysms Technical Paper Publication. IMECE2018-86120

Jingyu Wang, Jishan Luo, Robert Kunkel, Yingtao Liu, *University of Oklahoma, Norman, OK, United States*, Bradley Bohnstedt, *University of Oklahoma, Oklahoma City, OK, United States*, Chung-Hao Lee, *University of Oklahoma, Norman, OK, United States*

11:32am – Modified Laparoscopic Tool for Enhanced Haptic Feedback

Technical Paper Publication. IMECE2018-86345
Rajesh Kumar, Sudipto Mukherjee, *Indian Institute of Technology Delhi, New Delhi, India*

11:53am – A Novel Stent Graft that Contains Superelastic Nitinol and Ultra-Stretchable ePTFE for the Hemorrhage Control

Technical Presentation. IMECE2018-87829
Moataz Elsisy, Yanfei Chen, Bryan Tillman, Catherine Go, Sung Kwon Cho, William Clark, Tae hur, Yicheng Ding, Youngjae Chun, *University of Pittsburgh, Pittsburgh, PA, United States*

12:14pm – Demonstration and Experimental Validation of Plastic-Encased Resonant Ultrasonic Piezoelectric Actuator for MRI-Guided Surgical Robots

Technical Paper Publication. IMECE2018-87963
Paulo Carvalho, Christopher Nycz, Katie Gandomi, Gregory Fischer, *Worcester Polytechnic Institute, Worcester, MA, United States*

4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

4-10-5 Biomedical Modeling V

Third Floor, David L. Lawrence Convention Center, Room 311
10:50am–12:35pm

Session Chair: Shanzhong (Shawn) Duan, *Saint Martin's University, Lacey, WA, United States*

Session Co-Chair: Chao Liang, *Praxair, Inc., Tonawanda, NY, United States*

10:50am – The Wisdom of Crowds Approach to Influenza-Rate Forecasting

Technical Paper Publication. IMECE2018-86559
Jeff Morgan, *Joint Research and Development, Inc., Stafford, VA, United States*, **Otto Wilson**, *The Catholic University of America, Washington, DC, United States*, **Prahlad Menon**, *University of Pittsburgh, Pittsburgh, PA, United States*

11:11am – Non-Linear Analysis of Bio-Structures Through Refined Beam Models

Technical Paper Publication. IMECE2018-86848
Daniele Guarnera, *Erasmus Carrera, Ibrahim Kaleel, Alfonso Pagani, Politecnico di Torino, Torino, Italy*, **Marco Petrolo**, *Politecnico di Torino, Turin, Italy*

11:32am – Differential Plate Lengths in Long Bone Fixation Can Increase Peak Strains

Technical Presentation. IMECE2018-87557
David Jordan, *Mark Miller, University of Pittsburgh, Pittsburgh, PA, United States*, **Alexander Kharlamov**, *Allegheny General Hospital, Pittsburgh, PA, United States*

11:53am – Modeling Heat Regulation With a Structured Mesh, Finite Volume Approach in a Voxelized Domain

Technical Paper Publication. IMECE2018-88036
Rohan Amare, *Steven Eckels, Amir Bahadori, Kansas State University, Manhattan, KS, United States*

12:14pm – Analysis of Temperature in Surgical-Drilling of Ex-vivo Human Femurs Using Probabilistic Approach

Technical Presentation. IMECE2018-88811
Pandithevan Ponnusamy, *Prasannavenkadesan Varatharajan, Vinayaga Muruga Pandey Natarajan, Indian Institute of Information Technology Design and Manufacturing Kancheepuram, Chennai, Tamilnadu, India*

4-14 BIOTRANSPORT (FLUID, HEAT AND MASS)

4-14-2 Heat Transfer and Fluid

Third Floor, David L. Lawrence Convention Center, Room 315
10:50am–12:35pm

Session Chair: X. Gary Tan, *U.S. Naval Research Lab, Washington, DC, United States*

Session Co-Chair: Anne Schmitz, *Gannon University, Erie, PA, United States*

10:50am – Numerical Investigation of Heat Transfer in Tissues During Therapeutic Hyperthermia

Technical Paper Publication. IMECE2018-86485
Saeed Tiari, *Mahboobe Mahdavi, Kinjalkumar Chauhan, Davide Piovesan, Gannon University, Erie, PA, United States*

11:11am – Investigation of Radio-frequency Rewarming as a Means to Reduce Thermomechanical Stress During Ice-Free Rewarming From Cryopreservation Storage

Technical Presentation. IMECE2018-89224
Prem Solanki, *Yoed Rabin, Carnegie Mellon University, Pittsburgh, PA, United States*

11:32am – Review of Diffusive Transport in the Vitreous Humor: Experimental and Analytical Studies

Technical Presentation. IMECE2018-89421
Anita Penkova, *Satwindar Sadhal, University of Southern California, Los Angeles, CA, United States*

11:53am – Thermal Conductivity of Cryoprotective Agents in the Presence of Silica-Coated and Uncoated Iron-Oxide Nanoparticles

Technical Presentation. IMECE2018-89584
Lili Ehrlich, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Zhe Gao**, *John Bischof, University of Minnesota, Minneapolis, MN, United States*, **Yoed Rabin**, *Carnegie Mellon University, Pittsburgh, PA, United States*

4-2 DAMAGE BIOMECHANICS

4-2-2 Damage Biomechanics II: Ballistic Impact and Blast Effects and Analysis

Third Floor, David L. Lawrence Convention Center, Room 308
2:05pm–3:50pm

Session Chair: Reuben Kraft, *Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: Ashfaq Adnan, *University of Texas Arlington, Arlington, TX, United States*

2:05pm – The Strain Rates of the Brain and Skull Under Dynamic Loading

Technical Paper Publication. IMECE2018-88300
Mohammad Hosseini Farid, *Ashkan Eslaminejad, Mohammadreza Ramzanpour, Mariusz Ziejewski, Ghodrat Karami, North Dakota State University, United States*

2:20pm – Computational Analysis for Validation of Blast Induced Traumatic Brain Injury and Protection of Combat Helmet

Technical Paper Publication. IMECE2018-87689
X. Gary Tan, Amit Bagchi, *U.S. Naval Research Laboratory, Washington, DC, United States*

2:35pm – Indent Depth in the Clay Backing for Ceramic Armor

Technical Paper Publication. IMECE2018-88284
Timothy Zhang, Sikhanda S. Satapathy, *ARL WMRD, APG, MD, United States*

2:50pm – Development of an Experiment to Visualize Air Flow Into Ballistics Gelatin Targets Shot With Small Caliber Projectiles

Technical Presentation. IMECE2018-89706
Karim Muci-Kuchler, Steven Dixler, Aaron Bost, *South Dakota School of Mines and Technology, Rapid City, SD, United States*

3:05pm – A Multiscale Approach to Model Mechanoporation Damage in Neurons

Technical Presentation. IMECE2018-89588
A.H. Bakhtiary, *Mississippi State University, Mississippi State, MS, United States*, Michael Murphy, *Mississippi State University, Starkville, MS, United States*, M.D. Jones, *Cardiff University, Cardiff, Wales*, D. Bammann, R.K. Prabhu, *Mississippi State University, Starkville, MS, United States*

3:20pm – Mapping Combat Helmet Design and Operational Parameter Trade Spaces Based on Ballistic Threats and Head Injury Severity

Technical Presentation. IMECE2018-86725
Peter Matic, Robert Saunders, *U.S. Naval Research Laboratory, Washington, DC, United States*

4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION

4-5-3 Biomaterials and Tissue III: Sythesis and Characteriazation

Third Floor, David L. Lawrence Convention Center, Room 309
2:05pm–3:50pm

Session Chair: Karen Chang Yan, *The College of New Jersey, Ewing Township, NJ, United States*

Session Co-Chair: Anil Saigal, *Tufts University, Medford, MA, United States*

2:05pm – Development of Chemotherapy System Using Plasma Activated Medium to Enhance PC12 Axonal Extension

Technical Paper Publication. IMECE2018-86630
Takanobu Haccho, Hiroshi Ichikawa, Koji Yamamoto, Yusuke Morita, Eiji Nakamachi, *Doshisha University, Kyoto, Japan*

2:20pm – Development of Three-Dimensional DC Electric Field Stimulation Bio-Reactor for Axonal Outgrowth Enhancement

Technical Paper Publication. IMECE2018-86637
Shohei Tanaka, Ryota Sakiyama, Yusuke Morita, Koji Yamamoto, Eiji Nakamachi, *Doshisha University, Kyoto, Japan*

2:35pm – Development of Stretch Stimulation Device for Three-Dimensional Culture of PC12 Cells

Technical Paper Publication. IMECE2018-86643
Madoka Imura, Ryota Sakiyama, Yusuke Morita, Koji Yamamoto, Eiji Nakamachi, *Doshisha University, Kyoto, Japan*

2:50pm – Design and Fabrication of Pneumatic Soft Gripper

Technical Paper Publication. IMECE2018-86648
Zhonghua Guo, Xiaoning Li, Zhongsheng Sun, Nanjing University of Science and Technology, Nanjing, Jiangsu, China

3:05pm – Folding Artificial Mucosa With Cell-Laden Hydrogels Guided by Mechanics Models

Technical Presentation. IMECE2018-89290
Honfei Chan, *Hongkong City University, Hongkong, China*, Ruike Zhao, Xuanhe Zhao, *Massachusetts Institute of Technology, Cambridge, MA, United States*

3:20pm – Biomaterial Models Adjustment and Comparison for Ultra-High Molecular Weight Polyethylene in Finite Element Models

Technical Paper Publication. IMECE2018-87719
Humberto Corro Hernandez, *Universidad de Guanajuato, Guanajuato, Mexico*, Agustin Vidal-Lesso, Elias Ledesma, Antonio de Jesus Balvantin Garcia, *University of Guanajuato, Salamanca, Mexico*

4-7 BIOMEDICAL DEVICES

4-7-3 Fluid and Microfluid Biomedical Devices

Third Floor, David L. Lawrence Convention Center, Room 310
2:05pm–3:50pm

Session Chair: Chao Liang, *Praxair, Inc., Tonawanda, NY, United States*

Session Co-Chair: Margaret Nowicki, *U.S. Military Academy, West Point, NY, United States*

2:05pm – Design of Forward-Looking Intravascular Ultrasonic Transducer for Microbubble-Mediated Thrombolysis

Technical Presentation. IMECE2018-86464
Ho-Wuk Kim, Jinwook Kim, Huaiyu Wu, Xiaoning Jiang, *North Carolina State University, Raleigh, NC, United States*

2:26pm – An Approach to Capture Humidity From Exhaled Air

Technical Paper Publication. IMECE2018-86507
Sandra Grau Bartual, Ahmed M. Al-Jumaily, *Auckland University of Technology, Auckland, New Zealand*

2:47pm – Canal Design for SLA Printing of Closed Geometries

Technical Paper Publication. IMECE2018-87097
Erin Petrosky, Anne Schmitz, *Gannon University, Erie, PA, United States*

3:08pm – Development of a Hybrid Blood Pump for Extracorporeal Blood Circulation Devices

Technical Presentation. IMECE2018-87291
Nahmkeon Hur, Sungwon Kang, Wonjung Kim, *Sogang University, Seoul, Korea (Republic)*

3:29pm – Continuous Cell Sorting by Dielectrophoresis in a Straight Microfluidic Channel

Technical Paper Publication. IMECE2018-88156
Yuhao Qiang, Jia Liu, Darryl Dieujuste, Katrina Ramsamoj, Sarah E. Du, *Florida Atlantic University, Boca Raton, FL, United States*

4-9 CLINICAL APPLICATIONS OF BIOENGINEERING**4-9-1 Clinical Applications of Bioengineering I – Experimental Methods**

Third Floor, David L. Lawrence Convention Center, Room 311
2:05pm–3:50pm

Session Chair: Douglas E. Dow, *Wentworth Institute of Technology, Boston, MA, United States*

Session Co-Chair: Lara Thompson, *University of the District of Columbia, Washington, DC, United States*

2:05pm – Exploring Training Methodologies Towards the Improvement of Elderly Balance

Technical Paper Publication. IMECE2018-86815
Lara Thompson, Joao Augusto Renno Brusamolín, Jelani Guise, Mehdi Badache, Sandy Collado Estrada, Lonika Behera, Marzieh Savadkoobi, Tyra Coombs, Pablo Sanchez Guerrero, Devdas Shetty, *University of the District of Columbia, Washington DC, United States*

2:26pm – Investigation of Forces in Deep Hole Bone Drilling

Technical Paper Publication. IMECE2018-87064
JuEun Lee, Serena Chu, Craig L. Chavez, *University of the Pacific, Stockton, CA, United States*

2:47pm – A Clinical Experiment on Infant Applied Pressures During Breastfeeding

Technical Paper Publication. IMECE2018-87674
Lin Jiang, Diana Alatalo, *University of Texas at Dallas, Richardson, TX, United States*, Donna Geddes, *University of Western Australia, Crawley, WA, Australia*, Fatemeh Hassanipour, *University of Texas at Dallas, Richardson, TX, United States*

3:08pm – In Situ Tension of the Digital Nerves

Technical Presentation. IMECE2018-87835
Patrick J. Schimoler, Jacob Didesch, Peter Tang, Mark Carl Miller, *Allegheny General Hospital, Pittsburgh, PA, United States*

3:29pm – Experimental Study of Bio-Polymer Knee Implant Technical Paper Publication. IMECE2018-88479

Maria Ramos Gonzalez, Brendan O’Toole, Zhiyong Wang, *University of Nevada, Las Vegas, Las Vegas, NV, United States*

4-2 DAMAGE BIOMECHANICS**4-2-1 Damage Biomechanics I: Blunt Impact Effects and Analysis**

Third Floor, David L. Lawrence Convention Center, Room 308
4:00pm–5:45pm

Session Chair: C.S. Florio, *U.S. Army ARDEC, Picatinny Arsenal, NJ, United States*

Session Co-Chair: Amit Bagchi, *U.S. Naval Research Laboratory, Washington, DC, United States*

4:00pm – Ranking of Biomechanical Metrics to Describe Human Response to Impact-Induced Damage

Technical Paper Publication. IMECE2018-88007
Nicholas DeVogel, Anjishnu Banerjee, Frank Pintar, *Medical College of Wisconsin, Milwaukee, WI, United States*, Narayan Yoganandan, *Medical College of Wisconsin and VA Medical Center, Milwaukee, WI, United States*

4:15pm – Computational Human Torso Model Validation for Frontal Blunt Trauma

Technical Paper Publication. IMECE2018-88382
Carolyn Hampton, *ORISE, Bel Air, MD, United States*, Michael Kleinberger, *ARL, Aberdeen Proving Ground, MD, United States*

4:30pm – Cerebrospinal Fluid and Spherically Convergent Shear Waves During Blunt Head Trauma

Technical Presentation. IMECE2018-88389
Martin Ostojca-Starzewski, Amit Madhukar, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Ying Chen, *Simulia Corp., Katy, TX, United States*

4:45pm – Computational Modeling of Blunt Impact to Head and Correlation of Biomechanical Measures With Medical Images

Technical Paper Publication. IMECE2018-88026
X. Gary Tan, *U.S. Naval Research Laboratory, Washington, DC, United States*, Maria M. D’Souza, Subhash Khushu, *INMAS, New Delhi, India*, Raj K. Gupta, *USMRMC, Fort Detrick, MD, United States*, Virginia DeGiorgi, *U.S. Naval Research Laboratory, Washington, DC, United States*, Ajay K. Singh, *INMAS, New Delhi, India*, Amit Bagchi, *U.S. Naval Research Laboratory, Washington, DC, United States*

5:00pm – Monitoring Tissue Damage Using Cloud-Based Brain Biomechanics

Technical Presentation. IMECE2018-89984
Ritika Menghani, Reuben Kraft, *Pennsylvania State University, University Park, PA, United States*

5:15pm – Pelvic Injury Survival Analysis for a Finite Element Human Body Model Using Multiple Data Sets

Technical Paper Publication. IMECE2018-88447

Caitlin Weaver, Wake Forest University, Winston Salem, NC, United States, **Anna Miller**, Washington University, St. Louis, MO, United States, **Joel Stitzel**, Wake Forest University, Winston Salem, NC, United States

4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION

4-5-4 Biomaterials and Tissue IV: Synthesis and Characterization

**Third Floor, David L. Lawrence Convention Center, Room 309
4:00pm–5:45pm**

Session Chair: Anil Saigal, Tufts University, Medford, MA, United States

Session Co-Chair: Seyed Allameh, Northern Kentucky University, Newport, KY, United States

4:00pm – Reproduction of Kinematic Behavior of Elastic Lamellae in the Thoracic Aortic Media

Technical Paper Publication. IMECE2018-87242

Atsutaka Tamura, Yuya Kato, Tottori University, Tottori, Japan

4:21pm – Mechanical Properties of the Human Elbow Bones Measured by Nanoindentation and Microindentation

Technical Paper Publication. IMECE2018-87406

Dilpreet Singh, Pulak Mohan Pandey, Dinesh Kalyanasundaram, Indian Institute of Technology Delhi, New Delhi, India

4:42pm – Mechanical Property Determination of a Stereolithographic Resin Subjected to Compressive Loading

Technical Paper Publication. IMECE2018-87600

Christian Fry, Adam Mihalko, Robert Michael, Davide Piovesan, Gannon University, Erie, PA, United States

5:03pm – Correlation of Tumor Mechanical Rigidity to Cancer Stage and Chemotherapeutic Response

Technical Presentation. IMECE2018-89317

Brian Bush, National Institute of Standards and Technology, Gaithersburg, MD, United States

5:24pm – Self-Folding Microgels to Form Artificial Capillary Blood Vessels and a Mathematical Model to Decipher the Dynamics of Self-Folding

Technical Presentation. IMECE2018-89784

Chunxiao Cui, Devon Eichfeld, Sean Liu, Mingkun Wang, Li-Hsin Han, Drexel University, Philadelphia, PA, United States

4-6 SYMPOSIUM ON MECHANOBIOLOGY

4-6-1 Mechanobiology

**Third Floor, David L. Lawrence Convention Center, Room 317
4:00pm–5:45pm**

Session Chair: Hai-Chao Han, University of Texas at San Antonio, San Antonio, TX, United States

Session Co-Chair: Zhangli Peng, University of Notre Dame, Notre Dame, IN, United States

4:00pm – Shear Stress Induced Calcium Dependent Nuclear Deformation in Epithelial Cells

Technical Paper Publication. IMECE2018-87650

Deekshitha Jetta, Deepika Verma, Mohammad M. Maneshi, Susan Z. Hua, University at Buffalo, State University of New York, Buffalo, NY, United States

4:21pm – Pneumatic Microfluidic Cell Compression Device

Technical Presentation. IMECE2018-89141

Donghee Lee, Alek G. Erickson, University of Nebraska Medical Center, Omaha, NE, United States, **Taesun You**, Texas Department of Transportation, Houston, TX, United States, **Andrew T. Dudley**, University of Nebraska Medical Center, Omaha, NE, United States, **Sangjin Ryu**, University of Nebraska–Lincoln, Lincoln, NE, United States

4:42pm – A Multi-Physics Model for Mechanosensing in Cell Migration

Technical Presentation. IMECE2018-89346

Bahador Marzban, Hongyan Yuan, University of Rhode Island, Kingston, RI, United States

5:03pm – A Model for Cellular Mechanotransduction and Contractility at Finite Strain

Technical Presentation. IMECE2018-89389

Nikolaos Bouklas, Cornell University, Ithaca, NY, United States, **Selman Sakar, William Curtin**, EPFL, Lausanne, Switzerland

5:24pm – A Coupled Reaction-Diffusion-Strain Model of Mesenchymal Stem Cell Differentiation Into Osteoblasts

Technical Presentation. IMECE2018-89761

Matthew Dolack, Pennsylvania State University, State College, PA, United States

4-7 BIOMEDICAL DEVICES

4-7-4 Rehabilitation and Treatment Devices

Third Floor, David L. Lawrence Convention Center, Room 310
4:00pm–5:45pm

Session Chair: Liandong Yu, *Hefei University of Technology, Hefei, China*

Session Co-Chair: Shan Hu, *Iowa State University, Ames, IA, United States*

4:00pm – Minimizing Pain in Below Knee Amputees’ – Patients Wearing Prosthetic Socket by Increasing Flexibility in Specific Relief Areas

Technical Paper Publication. IMECE2018-86450

Gabi Nehme, Micheline Dib Nehme, Yousef Khalife, Antoun Chagoury, *University of Balamand, El-Koura, Lebanon North, Lebanon*

4:21pm – Development of a Passive Prosthetic Ankle With Slope Adapting Capabilities

Technical Paper Publication. IMECE2018-86593

Sandesh G. Bhat, Sangram Redkar, *Arizona State University, Mesa, AZ, United States, Thomas Sugar,* *Arizona State University, Chandler, AZ, United States*

4:42pm – Design of a Smart Glove Using Flexible Technology for Artificial Gripper

Technical Paper Publication. IMECE2018-86620

Vidya Nandikolla, Robin Bochen, Tristin Suhr, *California State University Northridge, Northridge, CA, United States*

5:03pm – Design and Prototype Development of a Reconfigurable Wheelchair With Stand-Sit-Sleep Configurations

Technical Paper Publication. IMECE2018-87905

Sumit Desai, Shankar Mantha, Vikas Phalle, Sangram Patil, Vishwadeep Handikherkar, *Veer mata Jijabai Technological Institute, Mumbai, Maharashtra, India*

5:24pm – Neural Network Modeling of Maximum Insertion Force of Bevel-Tip Surgical Needle

Technical Paper Publication. IMECE2018-88383

Sai Teja Reddy Gidde, Tololupe Verissimo, Nuo Chen, *Temple University, Philadelphia, PA, United States, Byoung-gook Loh,* *Hansung University, Seoul, Korea (Republic), Parsaoran Hutapea,* *Temple University, Philadelphia, PA, United States*

4-9 CLINICAL APPLICATIONS OF BIOENGINEERING

4-9-2 Clinical Applications of Bioengineering II

Third Floor, David L. Lawrence Convention Center, Room 311
4:00pm–5:45pm

Session Chair: Kalyani Nair, *Bradley University, Peoria, IL, United States*

Session Co-Chair: Li-Hsin Han, *Drexel University, Philadelphia, PA, United States*

4:00pm – Coupling Immunofluorescence and Optoelectrokinetic Technique for Escherichia Coli Detection and Quantification in Water

Technical Paper Publication. IMECE2018-86749

Uzumma O. Ozeh, *Purdue University Northwest, Hammond, IN, United States, A.G. Agwu Nnanna,* *University of Texas of the Permian Basin, Odessa, TX, United States, Justus C. Ndukaife,* *Vanderbilt University, Nashville, TN, United States*

4:21pm – Viscoelastic Properties of the L3-L4 Myofascial Tissue in Ankylosing Spondylitis Patients

Technical Paper Publication. IMECE2018-87906

Allison White, Hannah Abbott, *Bradley University, Peoria, IL, United States, Alfonse Masi,* *University of Illinois College of Medicine, Peoria, IL, United States, Kalyani Nair,* *Bradley University, Peoria, IL, United States*

4:42pm – Three-Dimensional Cephalometric Analysis Using Computed Tomographic Imaging

Technical Paper Publication. IMECE2018-88259

Prahlad Menon, Soroosh Sanatkhani, *University of Pittsburgh, Pittsburgh, PA, United States*

5:03pm – Deposition Control of a FDM 3D Printer Based Direct Writing System for Hydrogel Molding in Microfluidic Devices Fabrication

Technical Paper Publication. IMECE2018-88267

Karen Chang Yan, *The College of New Jersey, Ewing Township, NJ, United States, Jacob Boyle,* *The College of New Jersey, Hillsdale, NJ, United States, Kristi Petersen,* *The College of New Jersey, Ewing, NJ, United States*

5:24pm – A New Wideband Microwave Antenna for Breast Cancer Detection

Technical Paper Publication. IMECE2018-87390

Lulu Wang, Jinzhang Xu, *Hefei University of Technology, Hefei, China*

TRACK 5 DESIGN, RELIABILITY, SAFETY, AND RISK

- 5-1-1: Product and Process Design I**
- 5-1-2: Product and Process Design II**
- 5-1-3: Product and Process Design III**
- 5-1-4: Product and Process Design IV**
- 5-2-1: Social Context Aware Design**
- 5-4-1: CAD, CAM and CAE Design I**
- 5-4-2: CAD, CAM and CAE Design II**
- 5-5-1: Product Optimization I**
- 5-5-2: Product Optimization II**
- 5-8-1: Reliability and Risk in Energy Systems**
- 5-10-1: Topics on Safety and Hazard Analysis**
- 5-10-2: Topics on Risk and Hazard Analysis**
- 5-11-1: Failure and Forensic Analysis**
- 5-12-1: Reliability Methods**
- 5-13-1: Safety, Risk and Reliability of Emerging Technologies**
- 5-14-1: Testing for Product Reliability and Safety**
- 5-16-1: Safety in Transportation, Agriculture, and Off-Road Vehicles**
- 5-16-2: Safety in Transportation, Agriculture, and Off-Road Vehicles**
- 5-17-1: Structural Systems Crashworthiness**
- 5-17-2: Full Vehicle Crashworthiness and Occupants Protection**
- 5-18-2: General**
- 5-19-1: Design, Reliability, Safety, and Risk Plenary**

ACKNOWLEDGMENT

Track Organizers

Dumitru Caruntu, *University of Texas Rio Grande Valley, United States*
 Bogdan Epureanu, *University of Michigan, United States*
 Marco Amabili, *McGill University, Canada*

Topic Organizers

Shuichi Fukuda, *Keio University, Japan*
 Masato Inoue, *Meiji University, Japan*
 Caterina Rizzi, *University of Bergamo, Italy*
 Daniele Regazzoni, *University of Bergamo, Italy*
 Marco Rossoni, *Politecnico di Milano, Italy*
 Miri Weiss Cohen, *Braude College of Engineering, Israel*
 Antonio Caputi, *Università degli Studi di Bergamo, Italy*
 Guangdong Zhu, *NREL, United States*
 Zhiwen Ma, *NREL, United States*
 Mihai Diaconeasa, *UCLA, CA, United States*
 Alba Sofi, *University "Mediterranea" of Reggio Calabria, Italy*
 Xiaobin Le, *Wentworth Institute of Technology, United States*
 Arun Veeramany, *Pacific Northwest National Laboratory, United States*
 Bin Zhou, *FM Global, United States*

Chimba Mkandawire, *Exponent Inc., United States*
 Mohammad Pourgol-Mohammad, *JCI/Sahand University of Technology, United States*
 Enrique Droguett, *University of Chile, Chile*
 Dengji Zhou, *Shanghai Jiao Tong University, China*
 Jeremy Gernand, *Pennsylvania State University, United States*
 John Wiechel, *SEA, Limited, United States*
 Thomas Maull, *SEA, Limited, United States*
 Mohamed Ridha Baccouche, *Ford, United States*
 Saeed Barbat, *Ford Motor Company, United States*

Session Organizers

Daniele Regazzoni, *University of Bergamo, Italy*
 Pooya Mahmoudian, *Haskel International, United States*
 Shuichi Fukuda, *Keio University, Japan*
 Sina Mohsenian, *University of Massachusetts Lowell, United States*
 Anthony D Angelo, *US Army ARDEC, United States*
 Olga Sankowski, *Hamburg University of Technology, Germany*

Giorgio Colombo, *Politecnico Di Milano, Italy*
 Marco Rossoni, *Politecnico di Milano, Italy*
 Ragavanantham Shanmugam, *Anna University, India*
 Yucheng Liu, *Mississippi State University, United States*
 Jorge D. Camba, *Purdue University, United States*
 Antonio Caputi, *Università degli Studi di Bergamo, Italy*
 C.S. Florio, *US Army ARDEC, United States*
 Miri Weiss Cohen, *Braude College of Engineering, Israel*
 Victorita Radulescu, *University Politehnica of Bucharest, Romania*
 Guangdong Zhu, *NREL, United States*
 Bin Zhou, *FM Global, United States*
 Arun Veeramany, *Pacific Northwest National Laboratory, United States*
 John Wiechel, *SEA, Limited, United States*
 Javad Sattarvand, *University of Nevada, United States*
 Xiaobin Le, *Wentworth Institute of Technology, United States*
 Rudolf Reichert, *George Mason University, United States*

TRACK 5 DESIGN, RELIABILITY, SAFETY, AND RISK

MONDAY, NOVEMBER 12

5-1 PRODUCT AND PROCESS DESIGN

5-1-1 Product and Process Design I

Third Floor, David L. Lawrence Convention Center, Room 303
9:45am–11:30am

Session Chair: Daniele Regazzoni, *University of Bergamo, Dalmine (BG), Italy*

Session Co-Chair: Pooya Mahmoudian, *Haskel International, Burbank, CA, United States*

9:45am – Method of Construction for High Cycle Fatigue Resistant Pressure Vessels in Hydrogen Service

Technical Paper Publication. IMECE2018-86292
Pooya Mahmoudian, Haskel International, Burbank, CA, United States

10:06am – An Empirically Determined Design Guideline for Rectangular Cross Section Nitinol Flexure Hinges With the Focus on Flexibility-Strength Trade-Off

Technical Paper Publication. IMECE2018-86551
Suat Coemert, Mar Olmeda, Julia Fuckner, Christoph Rehekampff, Sandra Vanessa Brecht, Tim Christian Lueth, Technical University of Munich, Garching bei Muenchen, Bavaria, Germany

10:27am – Comparing Contact Stress Estimates of Some Straight Bevel Gears With ISO 10300 Standards

Technical Paper Publication. IMECE2018-86572
Edward Osakue, Texas Southern University, Houston, TX, United States, Lucky Anetor, Nigerian Defence Academy, Nigeria, Kaduna, Nigeria

10:48am – A Method for Constructing Standard Involute Gear Tooth Profile

Technical Paper Publication. IMECE2018-86573
Edward Osakue, Texas Southern University, Houston, TX, United States, Lucky Anetor, Nigerian Defence Academy, Nigeria, Kaduna, Nigeria

11:09am – Introducing ISO to AGMA Conversion Factors for Steel Spiral Bevel Gears Design Under Bending Fatigue

Technical Presentation. IMECE2018-89231
Mehmet Onur Ogulata, Karamanoglu Mehmetbey University, Karaman, Turkey, Necdet Geren, University of Cukurova, Adana, Turkey

5-5 PRODUCT OPTIMIZATION

5-5-1 Product Optimization I

Third Floor, David L. Lawrence Convention Center, Room 304
9:45am–11:30am

Session Chair: Miri Weiss Cohen, *Braude College of Engineering, Karmiel, Israel*

Session Co-Chair: C.S. Florio, *U.S. Army ARDEC, Picatinny Arsenal, NJ, United States*

9:45am – Structural Optimization of Truck Front-Frame Under Multiple Load Cases

Technical Paper Publication. IMECE2018-86293
Shuvodeep De, Karanpreet Singh, Berkan Alanbay, Rakesh Kapania, Virginia Tech, Blacksburg, VA, United States, Raymond Agüero, Metalsa, Roanoke, VA, United States

10:06am – Truss Design and Optimization Using Stress Analysis and NURBS Curves

Technical Paper Publication. IMECE2018-87728
Antonio Caputi, Università degli Studi di Bergamo, Dalmine (BG), Italy, Miri Weiss Cohen, Braude College of Engineering, Karmiel, Israel, Davide Russo, University of Bergamo, Dalmine, Italy, Caterina Rizzi, University of Bergamo, Rho (MI), Italy

10:27am – Optimization Methods for Controlling Stresses at Contacting Surfaces of Interference Fit Assemblies Under Axial and Torsional Loads

Technical Paper Publication. IMECE2018-88180
C.S. Florio, U.S. Army ARDEC, Picatinny Arsenal, NJ, United States

10:48am – A Novel Optimization Design Method of Additive Manufacturing Oriented Porous Structures

Technical Paper Publication. IMECE2018-86952
Jiaqi Zhao, Ming Zhang, Yu Zhu, Xin Li, Leijie Wang, Tsinghua University, Beijing, China

11:09am – Static Stress and Thermal Analysis of Connecting Rod Using FE-Analysis

Technical Presentation. IMECE2018-88846
Lalit Kumar Choudhary, Delhi Technological University, Delhi, India

5-11 FAILURE AND FORENSIC ANALYSIS

5-11-1 Failure and Forensic Analysis

Third Floor, David L. Lawrence Convention Center, Room 305
9:45am–11:30am

Session Chair: John Wiechel, *SEA, Limited, Columbus, OH, United States*

9:45am – Early Fault Warning of Spindle Based on the Adaptive Weighted Fuzzy Petri Net

Technical Paper Publication. IMECE2018-86042
Hai Li, Wei Wang, Qingzhao Li, Lei Fan, Pu Huang, University Electronic Science T China

10:06am – Test Results: Vehicle Responses to Simulated Drag Caused by Front Tire Tread Detachment; The Effect of Scrub Radius and Speed

Technical Paper Publication. IMECE2018-87609
Mark W. Arndt, *Transportation Safety, Technologies, Inc., Phoenix, AZ, United States*, Stephen Arndt, *Safety Engineering and Forensic Analysis, Phoenix, AZ, United States*

10:27am – Life Prediction of L6 Steel Using Strain-Life Curve and Strain Softening Phenomenon by Means of Low Cycle Fatigue Testing

Technical Presentation. IMECE2018-88867
Sanket Inamdar, *Bharat Forge Ltd., Pune, Maharashtra, India*

10:48am – Microstructure Characterization and Evaluation of Mechanical Properties for Friction Welded En-24 Alloy Steel

Technical Presentation. IMECE2018-89043
Vijay Gaikwad, *Bharat Forge Ltd., KCTI, Pune, Maharashtra, India*

5-14 TESTING FOR PRODUCT RELIABILITY AND SAFETY

5-14-1 Testing for Product Reliability and Safety
Fourth Floor, David L. Lawrence Convention Center, Room 406
9:45am–11:30am

Session Chair: John Wiechel, *SEA, Limited, Columbus, OH, United States*

9:45am – Sawing Status Prediction of Diamond Sawblade Sawing Concrete Based on the Characteristics of Material Composition

Technical Paper Publication. IMECE2018-86340
Shanshan Hu, Fan Yang, Zili Yang, Feixiang Xiong, Weiwei Shi, Hongqun Tang, *Guangxi University, Nanning, Guangxi, China*

10:06am – Testing for AM Products With Recycled Filaments

Technical Presentation. IMECE2018-87112
Serdar Tumkor, Jonathan Holman, *University of Pittsburgh, Johnstown, PA, United States*

10:27am – Product Design in a Global Economy

Technical Paper Publication. IMECE2018-87685
Dennis Guenther, *SEA Limited, Columbus, OH, United States*, Michael Arnett, Manuel Forero Rueda, *SEA Limited, Elk Grove Village, IL, United States*

10:48am – Statistical Time Domain Feature Based Approach to Assess the Performance Degradation of Rotary Seals

Technical Paper Publication. IMECE2018-87857
Madhumitha Ramachandran, Zahed Siddique, *University of Oklahoma, Norman, OK, United States*

11:09am – Considerations for Communications Systems in Underground Refuge Alternatives

Technical Paper Publication. IMECE2018-87952
Nicholas Damiano, Chenming Zhou, Bruce Whisner, *National Institute for Occupational Safety and Health, Pittsburgh, PA, United States*

5-17 CRASHWORTHINESS, OCCUPANT PROTECTION, AND BIOMECHANICS

5-17-1 Structural Systems Crashworthiness
Fourth Floor, David L. Lawrence Convention Center, Room 405
9:45am–11:30am

Session Chair: Rudolf Reichert, *George Mason University, Fairfax, VA, United States*

Session Co-Chair: Mohamed Ridha Baccouche, *Ford, Ann Arbor, MI, United States*

9:45am – Experimental and Numerical Studies on Dynamic Mechanical Properties of Metal-Polymer Hybrid Materials

Technical Paper Publication. IMECE2018-86521
Yiben Zhang, Lingyu Sun, Lijun Li, *Beihang University, Beijing, China*, Taikun Wang, Yantao Wang, *Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering Re, Zhengzhou, China*

10:06am – Side Structure Integrity Research for Passenger Rail Equipment

Technical Paper Publication. IMECE2018-87700
Shaun Eshraghi, Michael Carolan, A. Benjamin Perlman, *Volpe National Transportation Systems Center, Cambridge, MA, United States*

10:27am – Finite Element Analysis of the Passenger Rail Equipment Workstation Table Sled Test

Technical Paper Publication. IMECE2018-87751
Shaun Eshraghi, Kristine Severson, *Volpe National Transportation Systems Center, Cambridge, MA, United States*, David Hynd, *Transport Research Laboratory, Wokingham, Berkshire, United Kingdom*, A. Benjamin Perlman, *Volpe National Transportation Systems Center, Cambridge, MA, United States*

10:48am – Dynamic Energy Absorption Characteristics of Additively-Manufactured Macrolattice Materials

Technical Paper Publication. IMECE2018-88521
Keivan Davami, Mehrdad Mohsenizadeh, Michael Munther, Tyler Palma, *Lamar University, Beaumont, TX, United States*

11:09am – Numerical Study on Explosion Cutting Process of PMMA Plate and Key Factors Influence on Cutting Performance

Technical Paper Publication. IMECE2018-86793
Lei Ge, *Beihang University, Beijing, China*, Yantao Wang, Huipeng Hu, *Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering Re, Zhengzhou, China*, Lijun Li, Yiben Zhang, *Beihang University, Beijing, China*

5-1 PRODUCT AND PROCESS DESIGN

5-1-2 Product and Process Design II

Third Floor, David L. Lawrence Convention Center, Room 303
1:45pm–3:30pm

Session Chair: Shuichi Fukuda, *Keio University, Minato-ku, Tokyo, Japan*

Session Co-Chair: Sina Mohsenian, *University of Massachusetts Lowell, Lowell, MA, United States*

1:45pm – The Automatic Basketball Rebound System
Technical Paper Publication. IMECE2018-86715
Thomas Smith, Vidya Nandikolla, *California State University Northridge, Northridge, CA, United States*

2:06pm – Journal Bearing With Controllable Radial Clearance
Technical Paper Publication. IMECE2018-86748
Shahrbanoo Farkhondeh Biabnavi, *Cleveland State University, Beachwood, OH, United States*, **Majid Rashidi,** *Cleveland State University, Pepper Pike, OH, United States*

2:27pm – Cross Sectional Area Changes Due to Plastic Bending of Prismatic Bars
Technical Paper Publication. IMECE2018-87608
Michael Zielinski, *Rotor Clip Co Inc., Somerset, NJ, United States*, **Ismail Soner Cinoglu,** *Lehigh University, Bethlehem, PA, United States*

2:48pm – Numerical Analysis of the Contribution of Shot Peening in the Fatigue Strength of Multipass Welded Joints
Technical Paper Publication. IMECE2018-87720
Unai Etxeberria, *Jon Ander Esnaola, Ibai Ulacia,* *Mondragon Unibertsitatea - Mondragon Goi Eskola Politeknikoa J.M.A.S. Coop., Mondragon, Spain*, **Done Ugarte,** *Iñigo Llavori, Miren Larrañaga,* *Mondragon Unibertsitatea, Mondragon, Spain*, **Arkaitz Lopez-Jauregi,** *Escuela Politécnica Superior, Mondragon Unibertsitatea, Mondragon, Spain*

3:09pm – Reactive Nitrogen Plasma Spray Coating of Titanium Nitride: Plasma Torch Design and Coating Analysis
Technical Presentation. IMECE2018-88813
Sina Mohsenian, *University of Massachusetts Lowell, Lowell, MA, United States*

5-5 PRODUCT OPTIMIZATION

5-5-2 Product Optimization II

Third Floor, David L. Lawrence Convention Center, Room 304
1:45pm–3:30pm

Session Chair: Antonio Caputi, *Università degli Studi di Bergamo, Dalmine (BG), Italy*

Session Co-Chair: Victorita Radulescu, *University Politechnica of Bucharest, Bucharest, Romania*

1:45pm – Optimal Reaction Wrench Measuring Platform
Technical Paper Publication. IMECE2018-87057
Rajesh Kumar, Aditya Jain, Jitendra Prasad Khatait, *Indian Institute of Technology Delhi, New Delhi, India*

2:06pm – Systematic Study of the Effect of Non-Uniform Seal Stiffness on the Contact Stress in Flat-Faced Soft-Seated Spring Operated Pressure Relief Valves
Technical Paper Publication. IMECE2018-87926
Alex Schimanowski, Arthur Seibel, Josef Schlattmann, *Hamburg University of Technology, Hamburg, Germany*

2:27pm – Automotive Headlamp Design Optimization and Photometry Performance Improvement
Technical Presentation. IMECE2018-89120
Girish Kerur, Sachin M. Jadhao, *Savitribai Phule Pune University, Pune, Maharashtra, India*

2:48pm – Numerical Modeling of the Intelligent Heating Systems for Living Space
Technical Presentation. IMECE2018-89189
Victorita Radulescu, *University Politechnica of Bucharest, Bucharest, Romania*

3:09pm – Advanced Modeling and Experimental Validation of an Optimized Power Transformer Tank
Technical Paper Publication. IMECE2018-87769
Hélder Fernando Gonçalves Mendes, Cristiano José Pereira Coutinho, Sérgio Manuel Oliveira Tavares, Luís Miguel Ribeiro Félix, Agostinho Emanuel Nunes Martins de Matos, Efacec Energia, *Máquinas e Equipamentos Eléctricos, S.A., Porto, Porto, Portugal*, **José Filipe Bizarro Meireles, António Costa Marques Pinho, Joel Ricardo da Silva Teixeira,** *University of Minho, Guimarães, Portugal*

5-12 RELIABILITY METHODS

5-12-1 Reliability Methods

Third Floor, David L. Lawrence Convention Center, Room 305
1:45pm–3:30pm

Session Chair: Mohammad Pourgol-Mohammad, *JCI/Sahand University of Technology, York, PA, United States*

Session Co-Chair: Xiaobin Le, *Wentworth Institute of Technology, Boston, MA, United States*

1:45pm – Applications of the Monte Carlo Method for Estimating the Reliability of Components Under Multiple Cyclic Fatigue Loadings

Technical Paper Publication. IMECE2018-86130

Xiaobin Le, *Wentworth Institute of Technology, Boston, MA, United States*

2:06pm – System Wear Life Estimation Under Uncertainty

Technical Paper Publication. IMECE2018-87015

Mohammad Pourmostafaei, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Mohammad Pourgol-Mohammad**, *JCI/Sahand University of Technology, York, PA, United States*, **Mojtaba Yazdani**, **Hossein Salimi**, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*

2:27pm – A Whole Operation Life Cycle Model of Gas Turbine Blades Under Multi-Physics Based on Variation of Blade Profile Parameters

Technical Paper Publication. IMECE2018-87040

Dengji Zhou, **Tingting Wei**, **Ma Shixi**, **Huisheng Zhang**, **Zhenhua Lu**, **Shilie Weng**, *Shanghai Jiao Tong University, Shanghai, China*

2:48pm – Reliability-Based Optimal Design of a Micro-Grid System Under Natural Disasters

Technical Paper Publication. IMECE2018-88139

Zhetao Chen, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Zhimin Xi**, *Rutgers University - New Brunswick, Piscataway, NJ, United States*

3:09pm – An Investigation for Operational Reliability Assessment of Rolling Bearings Using Ensemble Stacked Deep Auto-encoders

Technical Presentation. IMECE2018-89518

Qibin Wang, **Xianguang Kong**, **Hongbo Ma**, **Lei Yin**, **Jiantao Chang**, **Yao Liu**, *Xidian University, Xi'an, China*

5-16 SAFETY IN TRANSPORTATION, AGRICULTURE, AND OFF-ROAD VEHICLES

5-16-1 Safety in Transportation, Agriculture, and Off-Road Vehicles

Fourth Floor, David L. Lawrence Convention Center, Room 406
1:45pm–3:30pm

Session Chair: John Wiechel, *SEA, Limited, Columbus, OH, United States*

1:45pm – Road Guard: Innovative Use of Plastic Waste Material in Redesigning Road Curbs

Technical Paper Publication. IMECE2018-86021

Ebenezer Ahiati, *Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

2:06pm – Low-Cost Wi-Fi Navigation of Smart Wheelchairs

Technical Paper Publication. IMECE2018-86277

Wafa Batayneh, **Khaled Hatamleh**, *Jordan University of Science & Technology, Irbid, Jordan*, **Amjad Nusayr**, *University of Houston–Victoria, Victoria, TX, United States*, **Rama AIQuraan**, **Aseel Al-Khaleel**, **Ahmad Bataineh**, *Jordan University of Science & Technology, Irbid, Jordan*

2:27pm – Variable Braking Force Using Intelligent Twin Calipers

Technical Paper Publication. IMECE2018-86594

Ganesh Vinayaga Sundaram, *Sri Venkateswara College of Engineering, Chennai, India*, **Chidambaram Subramanian**, *Centre for Tire Research, Blacksburg, VA, United States*

2:48pm – Optimal Design of a Conventional and Magnetorheological Fluid Brakes Using Sensitivity Analysis and Taguchi Method

Technical Paper Publication. IMECE2018-86775

Salwan Obaid Waheed Khafaji, **Noah Manring**, **Mohammed Al-Mudhafar**, *University of Missouri - Columbia, Columbia, MO, United States*

5-17 CRASHWORTHINESS, OCCUPANT PROTECTION, AND BIOMECHANICS

5-17-2 Full Vehicle Crashworthiness and Occupants Protection

Fourth Floor, David L. Lawrence Convention Center, Room 405
1:45pm–3:30pm

Session Chair: Lingyu Sun, *Beihang University, Beijing, China*

Session Co-Chair: Mohamed Ridha Baccouche, *Ford, Ann Arbor, MI, United States*

1:45pm – Development of Structural Countermeasures for NHTSA's Oblique Impact

Technical Paper Publication. IMECE2018-86684

Rudolf Reichert, **Cing-Dao (Steve) Kan**, *George Mason University, Fairfax, VA, United States*

2:06pm – A New Crashworthiness Design Method for Complex Vehicular Structures Using Principal Components Analysis (PCA) and Data Mining

Technical Presentation. IMECE2018-87703

Xianping Du, Feng Zhu, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States

2:27pm – Finite Element Model Validation of the Hybrid-III Rail Safety (H3-RS) Anthropomorphic Test Device (ATD)

Technical Paper Publication. IMECE2018-87736

Shaun Eshraghi, Kristine Severson, Volpe National Transportation Systems Center, Cambridge, MA, United States, David Hynd, Transport Research Laboratory, Wokingham, Berkshire, United Kingdom, A. Benjamin Perlman, Volpe National Transportation Systems Center, Cambridge, MA, United States

2:48pm – Pedestrian Collision Responses Using Legform Impactor Subsystem and Full-Sized Pedestrian Model on Different Workbenches

Technical Paper Publication. IMECE2018-87904

Obaidur Rahman Mohammed, Hamid Lankarani, Shabbir Memon, Wichita State University, Wichita, KS, United States

3:09pm – A Peak-Selection RBF Mesh Morphing Method for Subject-Specific Child Occupant Modeling

Technical Paper Publication. IMECE2018-88398

Yunlei Yin, Wenxiang Dong, Chongqing University, Chongqing, China, Zhenfei Zhan, Chongqing University, Livonia, MI, United States, JunMing Li, Chongqing University, Chongqing, China

5-1 PRODUCT AND PROCESS DESIGN

5-1-3 Product and Process Design III

Third Floor, David L. Lawrence Convention Center, Room 303
3:45pm–5:30pm

Session Chair: Anthony D Angelo, U.S. Army ARDEC, Hillsborough, NJ, United States

Session Co-Chair: Olga Sankowski, Hamburg University of Technology, Hamburg, Hamburg, Germany

3:45pm – Effective Design Team Composition Using Individual and Group Cognitive Attributes

Technical Paper Publication. IMECE2018-86888

Kaitlyn Fritz, Line Deschenes, Vijitashwa Pandey, Oakland University, Rochester, MI, United States

4:06pm – Application of Moving Particle Simulation Method to Transmission Design Process

Technical Presentation. IMECE2018-87310

Chulmin Ahn, Hyundai Motor Group, Hwaseong-si, Gyeonggi-do, Korea (Republic)

4:27pm – Using Multi-Channel Human-System Interaction for User-Centered Product Design

Technical Paper Publication. IMECE2018-88091

Olga Sankowski, Dieter Krause, Hamburg University of Technology, Hamburg, Hamburg, Germany

4:48pm – Hand Design Selection for Precision Grasping of Small Objects Based on Hand-object System Workspace Technical Presentation. IMECE2018-89640

Roshan Kumar Hota, Indian Institute of Technology, Kharagpur, Kharagpur, West Bengal, India, Kumar Cheruvu, Indian Institute of Technology Kharagpur, Kharagpur, India

5:09pm – A Systems Engineering Approach to Incorporating the Internet of Things to Reliability-Risk Modeling for Ranking Conceptual Designs

Technical Paper Publication. IMECE2018-86711

Anthony D. Angelo, U.S. Army ARDEC, Hillsborough, NJ, United States, Edwin K.P. Chong, Colorado State University, Ft. Collins, CO, United States

5-8 RELIABILITY AND RISK IN ENERGY SYSTEMS

5-8-1 Reliability and Risk in Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 304
3:45pm–5:30pm

Session Chair: Guangdong Zhu, NREL, Englewood, CO, United States

3:45pm – A Novel Hybrid Strategy for Multimode Operation Mapping and Feature Extraction on Data-Driven Statistical Fault Detection Methods

Technical Paper Publication. IMECE2018-87417

Horacio Pinzon, Cinthia Audivet, Melitsa Torres, Marlon Consuegra, Javier Alexander, Marco Sanjuan, Promigas, Barranquilla, Colombia

4:06pm – Seismic Probabilistic Risk Assessment of Nuclear Power Plants: 10 CFR 50.69 Assumptions and Sources of Uncertainty

Technical Paper Publication. IMECE2018-87677

Sara Lyons, U.S. Nuclear Regulatory Commission, Kensington, MD, United States, Shilp Vasavada, U.S. Nuclear Regulatory Commission, Washington, DC, United States

4:27pm – Life Assessment of Gas Turbine Blades Under Creep Failure Mechanism Considering Humidity

Technical Paper Publication. IMECE2018-87883

Bitasoltanmohammadlou, Sahand University of Technology, Tabriz, East Azarbaijan, Iran, Mohammad Pourgol-Mohammad, JCI/Sahand University of Technology, York, PA, United States, Mojtaba Yazdani, Sahand University of Technology, Tabriz, East Azarbaijan, Iran

4:48pm – Accelerated Degradation Testing of Rigid Wet Cooling Media to Analyse the Impact of Calcium Scaling

Technical Paper Publication. IMECE2018-88508

Hemanth Narayan Dakshinamurthy, Ashwin Siddarth, University of Texas at Arlington, Arlington, TX, United States, Abhishek Guhe, Mestex, A Division of Mestek Inc., Dallas, TX, United States, Rajesh Kasukurthy, University of Texas at Arlington, Arlington, TX, United States, James Hoverson, Mestex, A Division of Mestek Inc., Dallas, TX, United States, Dereje Agonafer, University of TTX, United States

5:09pm – Adhesion Durability in Photovoltaic Backsheets as a Function of Indoor Accelerated Weathering Exposure
Technical Presentation. IMECE2018-89704

Scott Julien, Jianfeng Sun, *Northeastern University, Boston, MA, United States*, **Yu Wang**, *Case Western Reserve University, Cleveland, OH, United States*, **Andrew Fairbrother, Xiaohong Gu**, *National Institute of Standards and Technology, Gaithersburg, MD, United States*, **Sophie Napoli**, *Arkema, Inc., King of Prussia, PA, United States*, **Liang Ji, Kenneth P. Boyce**, *Underwriters Laboratories, LLC, Northbrook, IL, United States*, **Michael Kempe**, *National Renewable Energy Laboratory, Golden, CO, United States*, **Roger H. French, Laura S. Bruckman**, *Case Western Reserve University, Cleveland, OH, United States*, **Gregory S. O'Brien, Adam W. Hauser**, *Arkema, Inc., King of Prussia, PA, United States*, **Kai Tak Wan**, *Northeastern University, Boston, MA, United States*

5-13 SAFETY, RISK AND RELIABILITY OF EMERGING TECHNOLOGIES

5-13-1 Safety, Risk and Reliability of Emerging Technologies

Third Floor, David L. Lawrence Convention Center, Room 305
3:45pm–5:30pm

Session Chair: Mohammad Pourgol-Mohammad, *JCI/Sahand University of Technology, York, PA, United States*

Session Co-Chair: Jeremy M. Gernand, *Pennsylvania State University, University Park, PA, United States*

3:45pm – Examining Pulmonary Toxicity of Engineered Nanoparticles Using Clustering for Safe Exposure Limits
Technical Paper Publication. IMECE2018-87431

Vignesh Ramchandran, *Pennsylvania State University, University Park, PA, United States*, **Jeremy Gernand**, *Pennsylvania State University, Port Matilda, PA, United States*

4:06pm – Limit Load Analysis of As-Fabricated Pipe Bends With Low Ovality Under In-Plane Closing Moment Loading and Internal Pressure

Technical Paper Publication. IMECE2018-88004
Sherif Sorour, Mostafa Shazly, *The British University in Egypt, El Sherouk City, Egypt*, **Mohammad Megahed**, *Cairo University, Giza, Cairo, Egypt*

4:27pm – Real-Time Fault Diagnosis of Rotating Machinery Based on Improved 1-D Convolutional Neural Network Under Noisy Environment

Technical Presentation. IMECE2018-88878
Liu Xingchen, Qi Caizhou, Zhao Jiong, Shen Hehong, Xiong Xiaolei, *Tongji University, Shanghai, Shanghai, China*

4:48pm – Flammability Risk Assessment of Mildly Flammable Refrigerant Leak From Roof Top Unit
Technical Presentation. IMECE2018-89011

Ahmed Elatar, Ahmad Abu-Heiba, Mingkan Zhang, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Kevin Dean Edwards**, *Oak Ridge National Laboratory, Knoxville, TN, United States*, **Viral Patel, Van Baxter**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Omar Abdelaziz**, *Cleat Consulting, Dubai, United Arab Emir.*

5:09pm – Uncertainty Optimization Design of Vehicle Wheel Made of Long Glass Fiber Reinforced Thermoplastic
Technical Paper Publication. IMECE2018-86769

Daijun Hu, Yingchun Shan, Xiandong Liu, Weihao Chai, *Beihang University, Beijing, China*, **Xiaoyin Wang**, *Pan Asia Technical Automotive Center Co., Ltd., Shanghai, China*

5-16 SAFETY IN TRANSPORTATION, AGRICULTURE, AND OFF-ROAD VEHICLES

5-16-2 Safety in Transportation, Agriculture, and Off-Road Vehicles

Fourth Floor, David L. Lawrence Convention Center, Room 406
3:45pm–5:30pm

Session Chair: John Wiechel, *SEA, Limited, Columbus, OH, United States*

3:45pm – Vulnerability Analysis of Link-Weighted Shanghai Metrorail Transit Network

Technical Paper Publication. IMECE2018-86863
Yanjie Zhang, *Tongji University, Shanghai, China*, **Yalda Saadat**, *University of Maryland College Park, College Park, MD, United States*, **Dongming Zhang**, *Tongji University, Shanghai, China*, **Bilal Ayyub**, *University of Maryland College Park, College Park, MD, United States*, **Hongwei Huang**, *Tongji University, Shanghai, China*

4:06pm – Design, Installation, and Validation of a Data Acquisition System

Technical Paper Publication. IMECE2018-87071
Yucheng Liu, Andrew LeClair, Matthew Doude, Reuben F. Burch V, *Mississippi State University, Mississippi State, MS, United States*

4:27pm – A Model Based Framework for Wheel Lock Simulation in a Brake Dynamometer Towards Heavy Road Vehicle Safety

Technical Paper Publication. IMECE2018-87230
Indeevar Shyam Lanka, Akhil Challa, Nithya Sridhar, *Indian Institute of Technology Madras, Chennai, India*, **Sankarganesh Sankaralingam**, *Madras Engineering Industries Private Limited, Chennai, India*, **Shankar Coimbatore Subramanian**, *Indian Institute of Technology, Madras, Chennai, India*, **Gunasekaran Vivekanandan**, *Madras Engineering Industries Private Limited, Chennai, India*

4:48pm – Post-Failure Recovery Strategies for Metrorail Transit Networks With Washington D.C. as a Case Study

Technical Paper Publication. IMECE2018-87471
Yalda Saadat, *University of Maryland College Park, College Park, MD, United States*, **Yanjie Zhang, Dongming Zhang, Hongwei Huang**, *Tongji University, Shanghai, China*, **Bilal Ayyub**, *University of Maryland College Park, College Park, MD, United States*

5:09pm – Analytical Vehicle KANO Model Development

Technical Paper Publication. IMECE2018-87825
Jiaquan Chen, *FAW, Rochester, MI, United States*, **Yin-ping Chang**, *Oakland University*

TUESDAY, NOVEMBER 13

5-19 DESIGN, RELIABILITY, SAFETY, AND RISK PLENARY

5-19-1 Design, Reliability, Safety, and Risk Plenary
Third Floor, David L. Lawrence Convention Center, Room 304
8:00am–8:45am

8:00am – Autonomous Vehicle Safety: Tomorrow's Rewards Versus Today's Reality

Plenary Presentation. IMECE2018-90096
Roger McCarthy, *McCarthy Engineering, Palo Alto, CA, United States*

5-1 PRODUCT AND PROCESS DESIGN

5-1-4 Product and Process Design IV
Third Floor, David L. Lawrence Convention Center, Room 303
10:00am–11:45am

Session Chair: Giorgio Colombo, *Politecnico di Milano, Milan, Italy*

Session Co-Chair: Ragavanantham Shanmugam, *Anna University, Chennai, India*

10:00am – Design and Development of a Low-Cost Roof Top Solar Ventilator

Technical Paper Publication. IMECE2018-86997
Ragavanantham Shanmugam, *Anna University, Chennai, India*, Umayakumar Vellaisamy, *Larsen and Toubro Limited, Chennai, India*, Karthikeyan Balasubramaniam, *Wheels India Limited, Chennai, India*, Sathishkumar Mani, *Anna University, Chennai, India*

10:21am – A Small-Scale Robotic Spill Detection and Cleaning Method

Technical Paper Publication. IMECE2018-87180
Hussain F. Alsaif, Houssam Antar, Demetri Baker, Ashmita Tandon, Jack Manning, Guohua Ma, James McCusker, *Wentworth Institute of Technology, Boston, MA, United States*

10:42am – Unmanned Underwater Drone Design for Ocean Exploration

Technical Paper Publication. IMECE2018-87649
Rojitha Goonesekere, Yu Guo, *Midwestern State University, Wichita Falls, TX, United States*

11:03am – Nuclear Storage Cask Inspection Robotics as a Case Study in System Design Challenges

Technical Paper Publication. IMECE2018-88374
Jen Bracken, Sean N. Brennan, Ian Van Sant, *Pennsylvania State University, University Park, PA, United States*, Cliff Lissenden, *Pennsylvania State University, State College, PA, United States*, Karl Reichard, *Pennsylvania State University, University Park, PA, United States*

11:24am – The Improved Model of Particle Shape Prediction Considering the Choke-Level Effect for Cone Crusher

Technical Paper Publication. IMECE2018-88603
Wei Zhang, Wang Jixin, *Jilin University, Changchun, China*, Yu Xiangjun, *Kunming University, Kunming, China*

5-4 CAD, CAM AND CAE DESIGN

5-4-1 CAD, CAM and CAE Design I
Third Floor, David L. Lawrence Convention Center, Room 304
10:00am–11:45am

Session Chair: Marco Rossoni, *Politecnico di Milano, Milan, Italy*

Session Co-Chair: Yucheng Liu, *Mississippi State University, Mississippi State, MS, United States*

10:00am – Computational Design and Analysis of Nitinol-Based Arch Wedge Support

Technical Paper Publication. IMECE2018-86287
Tyler N. Stranburg, Yucheng Liu, Harish Chander, Adam Knight, *Mississippi State University, Mississippi State, MS, United States*

10:21am – Analysis of Reciprocating Seals in the Wet-Mate Electrical Connectors for Underwater Applications

Technical Paper Publication. IMECE2018-86988
Quan Han, Yan Zhang, Haiyang Chen, Juekuan Yang, Yunfei Chen, *Southeast University, Nanjing, Jiangsu, China*

10:42am – BIM Integration to Railway Projects – Case Study

Technical Presentation. IMECE2018-88851
Mounir Bensalah, *Ibn Tofail University, ENSAK - Colas Rail Maroc, Casablanca, Morocco*, Abdelmajid Elouadi, Hassan Mharzi, *Ibn Tofail University, ENSAK, Kénitra, Morocco*

11:03am – A Big Shift in Engineering: What Issues are Expected and How We Could Possibly Deal With Them

Technical Presentation. IMECE2018-89170
Shuichi Fukuda, *Keio University, Minato-ku, Tokyo, Japan*

11:24am – An Algorithm for Similar 3D Model Difference Examination Using Geometric Matching

Technical Paper Publication. IMECE2018-86996
Lianshui Guo, Yue Yin, *Beihang University, Beijing, China*

5-10 GENERAL TOPICS ON RISK, SAFETY AND RELIABILITY

5-10-1 Topics on Safety and Hazard Analysis

Third Floor, David L. Lawrence Convention Center, Room 305
10:00am–11:45am

Session Chair: Bin Zhou, *FM Global, Norwood, MA, United States*

Session Co-Chair: Arun Veeramany, *Pacific Northwest National Laboratory, Richland, WA, United States*

10:00am – Occupational Safety Implications of the Changing Energy Mix

Technical Paper Publication. IMECE2018-86678

Jeremy Gernand, *Pennsylvania State University, Port Matilda, PA, United States*

10:21am – Track Shape, Resulting Dynamics, and Injury Rates of Greyhounds

Technical Paper Publication. IMECE2018-87156

Fatemeh Mahdavi, Md. Imam Hossain, Hasti Hayati, Paul Kennedy, David Eager, *University of Technology Sydney, Sydney, NSW, Australia*

10:42am – Engineering a Pool Ladder to Prevent Drownings in Above-Ground Pools

Technical Paper Publication. IMECE2018-87875

William Pierce, Richard Ziernicki, *Knott Laboratory LLC, Centennial, CO, United States*

11:03am – A Set of Preliminary Model Experiments for Studying Engineering Student Biases in the Assessment and Prioritization of Risks

Technical Paper Publication. IMECE2018-87888

Jeremy Gernand, *Pennsylvania State University, Port Matilda, PA, United States*

11:24am – Design and Testing of a Novel Human Vibration Measurement System to Analyze the Connection Between Vibration Exposure and Hearing Loss

Technical Presentation. IMECE2018-89867

Olivia Bridston, Gaelen Murray, Zac Oldham, *Gonzaga University, Spokane, WA, United States*

5-2 SOCIAL CONTEXT AWARE DESIGN

5-2-1 Social Context Aware Design

Third Floor, David L. Lawrence Convention Center, Room 303
1:45pm–3:30pm

Session Chair: Shuichi Fukuda, *Keio University, Minato-ku, Tokyo, Japan*

Session Co-Chair: Marco Rossoni, *Politecnico di Milano, Milano, Italy*

1:45pm – Printed and 360 Head-Mounted Display Rendering: A Cross-Cultural Study Comparing Utility, Spatial Representation and Emotional Capabilities

Technical Paper Publication. IMECE2018-87163

Juan-Carlos Rojas, *Tecnologico de Monterrey, Monterrey, Nuevo León, Mexico*, **Juan Luis Higuera-Trujillo**, *Universitat Politècnica de València, Valencia, Valencia, Spain*, **Roberto Mora-Salinas**, *Tecnológico de Monterrey, Puebla, Puebla, Mexico*, **Jessica Galindo**, *Tecnologico de Monterrey, Puebla, Mexico*, **Susana Iñarra Abad**, *Universitat Politècnica de València - I3B, Valencia, Spain*

2:06pm – Binomial Parameter Estimation and Mapping for Demand Prediction: A Case Study of Bike Sharing Station Expansion Design

Technical Paper Publication. IMECE2018-87865

Bryan Watson, Cassandra Telenko, *Georgia Institute of Technology, Atlanta, GA, United States*

2:27pm – Scalability Considerations in the Design of Microgrids to Support Socioeconomic Development in Rural Communities

Technical Paper Publication. IMECE2018-88441

Hailie Suk, *University at Buffalo, State University of New York, Buffalo, NY, United States*, **Abhishek Yadav**, *University of Oklahoma, Norman, OK, United States*, **John Hall**, *University at Buffalo, State University of New York, Buffalo, NY, United States*

2:48pm – Decision Making Under Severe Uncertainty in Engineering Projects

Technical Presentation. IMECE2018-89744

Sara Naranjo Corona, *Oakland University, Clarkston, MI, United States*, **Vijitashwa Pandey, Judson Estes**, *Oakland University, Rochester, MI, United States*

3:09pm – From Customer Requirements to Detailed Design: How Do Product Data Change?

Technical Paper Publication. IMECE2018-87900

Marco Rossoni, Giorgio Colombo, Luca Bergonzi, *Politecnico di Milano, Milan, Italy*

5-4 CAD, CAM AND CAE DESIGN

5-4-2 CAD, CAM and CAE Design II

Third Floor, David L. Lawrence Convention Center, Room 304
1:45pm–3:30pm

Session Chair: Daniele Regazzoni, *University of Bergamo, Dalmine (BG), Italy*

Session Co-Chair: Jorge D. Camba, *Purdue University, West Lafayette, IN, United States*

1:45pm – A Study on Sampling Strategies to Determine the Variability of Parametric History-Based 3D CAD Models

Technical Paper Publication. IMECE2018-87404

Manuel Contero, Ferran Naya, David Pérez-López, *Universitat Politècnica de València, Valencia, Spain*, **Pedro Company**, *Universitat Jaume I, Castellón, Castellón, Spain*, **Jorge D. Camba**, *Purdue University, West Lafayette, IN, United States*

2:06pm – Motion Capture and Data Elaboration to Analyze Wheelchair Setup and Users' Performance

Technical Paper Publication. IMECE2018-87531

Daniele Regazzoni, **Andrea Vitali**, *University of Bergamo, Dalmine (BG), Italy*, **Caterina Rizzi**, *University of Bergamo, Rho (MI), Italy*, **Filippo Colombo Zefinetti**, *University of Bergamo, Dalmine (BG), Italy*

2:27pm – Research on a Multi-Fidelity Surrogate Model Based Model Updating Strategy

Technical Paper Publication. IMECE2018-88421

Ping Wang, **Qingmiao Wang**, **Xin Yang**, *Chongqing University, Chongqing, China*, **Zhenfei Zhan**, *Chongqing University, Livonia, MI, United States*

2:48pm – Extending Model Based Definition (MBD) to Capture Product Behavior and Contextual Information Using a Model Based Feature Information Network (MFIN)

Technical Presentation. IMECE2018-89646

Saikiran Gopalakrishnan, **Kevin J. Del Re**, *Purdue University, West Lafayette, IN, United States*, **Daniel Campbell**, *Capvidia, Sugar Land, TX, United States*, **Rosemary Astheimer**, **Michael D. Sangid**, **Nathan W. Hartman**, *Purdue University, West Lafayette, IN, United States*

3:09pm – Identification, Modeling and Experimental Characterization of Oil/Gas Drill Pipe Failure

Technical Presentation. IMECE2018-88815

Jamil Abdo, *Frostburg State University, Frostburg, MD, United States*, **Edris Hassan**, *Sultan Qaboos University, Muscat, Oman*, **Jan Kwak**, *Qatar University, Doha, Qatar*

5-10 GENERAL TOPICS ON RISK, SAFETY AND RELIABILITY

5-10-2 Topics on Risk and Hazard Analysis

Third Floor, David L. Lawrence Convention Center, Room 305
1:45pm–3:30pm

Session Chair: John Wiechel, *SEA, Limited, Columbus, OH, United States*

Session Co-Chair: Javad Sattarvand, *University of Nevada, Reno, NV, United States*

1:45pm – Escalator Risk and Assessment of Safety Review

Technical Paper Publication. IMECE2018-87889

Thomas Bress, *Exponent, Bowie, MD, United States*, **Eugenia Kennedy**, *Exponent, Natick, MA, United States*, **Rob Kupkovits**, *Exponent, Atlanta, GA, United States*

2:00pm – Equipment Fault Diagnosis Based on Image Recognition From Sensor Network Using Deep Learning

Technical Presentation. IMECE2018-89156

Tingting Wei, **Ma Shixi**, **Dengji Zhou**, *Shanghai Jiao Tong University, Shanghai, China*

2:15pm – Flexible Parametric Proportional Hazard Model for Performance Assessment in Complex Systems: Case Study of Mining Equipment

Technical Presentation. IMECE2018-89315

Amin Moniri-Morad, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Mohammad Pourgol-Mohammad**, *JCI/Sahand University of Technology, York, PA, United States*, **Amid Agha Babaei**, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Javad Sattarvand**, *University of Nevada, Reno, NV, United States*

2:30pm – Study on the Structural Stability Evaluation of Telescopic Boom Crane for ROV Lars

Technical Presentation. IMECE2018-89076

Namsub Woo, **Young Ju Kim**, **Hyunji Kim**, **Sangmok Han**, *Korea Institute of Geoscience and Mineral Resources, Pohang, Korea (Republic)*, **Jiho Ha**, *Korea Institute of Geoscience and Mineral Resources, Pohang-si, Gyeongsangbuk-do, Korea (Republic)*, **Sunchul Huh**, *Gyeongsang National University, Tongyeong-si, Gyeongsangnam-do, Korea (Republic)*

2:45pm – Numerical Analysis of Propagation Characteristics of Hazard and Noxious Substance (HNS) Based on the Kriging Model

Technical Presentation. IMECE2018-88830

Seong Hyuk Lee, **C.H. Jeong**, **Min Kyu Ko**, *Chung-Ang University, Seoul, Korea (Republic)*, **Moonjin Lee**, *KRISO, Daejeon, Korea (Republic)*, **Joo Hyun Moon**, *Chung-Ang University, Seoul, Korea (Republic)*

3:00pm – Remaining Useful Life (RUL) Prediction of Rolling Element Bearing Using Random Forest and Gradient Boosting Technique

Technical Paper Publication. IMECE2018-87623

Sangram Patil, **Aum Patil**, **Vishwadeep Handikherkar**, **Sumit Desai**, **Vikas Phalle**, **Faruk Kazi**, *V Technological Institute, Mumbai, Maharashtra, India*

5-18 GENERAL

5-18-1 General

Third Floor, David L. Lawrence Convention Center, Room 302
3:45pm–5:30pm

Session Chair: Mohammad Pourgol-Mohammad, *JCI/Sahand University of Technology, York, PA, United States*

3:45pm – How Much Is Too Much for a Seatback Recline to Promote Occupant Submarining: A Study Using Rigid Seat Sled Model and 5th Percentile Female ATD

Technical Paper Publication. IMECE2018-86258
Chandra Thorbole, *TST LLC, Rogers, AR, United States*

4:27pm – Extension Injuries During Motor Vehicle Collisions in Thoracic Spines With Pre-Existing Pathology

Technical Paper Publication. IMECE2018-86701
Mathieu Davis, *Exponent, Philadelphia, PA, United States*, **Sridhar Natarajan**, *Exponent, Phoenix, AZ, United States*, **Amy Mumbower**, *UT Health San Antonio, San Antonio, TX, United States*, **Jacob Fisher**, *Exponent, Philadelphia, PA, United States*

4:48pm – Assessing Occupant Motion and Seat Back Performance of Contemporary Seats in Rear Impact Collisions

Technical Paper Publication. IMECE2018-87997
Steven Meyer, **Arin Nelson**, **Jeremy McMillin**, **Brian Herbst**, *Safety Analysis & Forensic Engineering (SAFE) Laboratories LLC, Goleta, CA, United States*

5:09pm – Comparison Study on Reliability Index Approach, Performance Measure Approach and Monte Carlo Simulation Method for Pipeline Reliability Evaluation

Technical Presentation. IMECE2018-87326
Shabbir Memon, **Obaidur Rahman Mohammed**, **Hamid Lankarani**, *Wichita State University, Wichita, KS, United States*

5-18-2 General

Third Floor, David L. Lawrence Convention Center, Room 303
3:45pm–5:30pm

Session Chair: Mohammad Pourgol-Mohammad, *JCI/Sahand University of Technology, York, PA, United States*

3:45pm – A Decision-Based Mobility Model and Value of Information for Autonomous Ground Vehicles

Technical Presentation. IMECE2018-89630
Sam Kassoumeh, **Line Deschenes**, **Vijitashwa Pandey**, *Oakland University, Rochester, MI, United States*, **David Gorsich**, *U.S. Army RDECOM - TARDEC, Warren, MI, United States*

4:06pm – Design of Smart Electromagnetic Clutch and Development of Control Algorithm for Implementation in a 4-Wheeler

Technical Presentation. IMECE2018-88759
Vedanth Reddy, *National Institute of Technology Suratkal-Karnataka, Suratkal, Karnataka, India*

4:27pm – Calculation of Neck Loads in Minor Impact

Technical Paper Publication. IMECE2018-88655
John Wiechel, *SEA, Limited, Columbus, OH, United States*

4:48pm – Mitigating Vehicle Incompatibility in Rear Impacts

Technical Paper Publication. IMECE2018-88268
Christopher Clarke, *SAFE, Santa Barbara, CA, United States*, **Steven Meyer**, *SAFE LLC, Goleta, CA, United States*, **Brian Herbst**, *SAFE Laboratories LLC, Goleta, CA, United States*, **Lauren Bell**, *SAFE, Santa Barbara, CA, United States*

5:09pm – Analysis of Deformation Induced Vehicle Door Latch Actuation

Technical Paper Publication. IMECE2018-88205
Christopher Clarke, *SAFE, Santa Barbara, CA, United States*, **Steven Meyer**, **Brian Herbst**, *SAFE Laboratories LLC, Goleta, CA, United States*, **Lauren Bell**, *SAFE, Santa Barbara, CA, United States*

TRACK 6 DYNAMICS, VIBRATION, AND CONTROL

- 6-1-1: Dynamics, Vibration, and Control Plenary**
- 6-2-1: Dynamics, Vibration, and Control – I**
- 6-2-2: Dynamics, Vibration, and Control – II**
- 6-3-1: Nonlinear Dynamics, Control, and Stochastic Mechanics I**
- 6-3-2: Nonlinear Dynamics, Control, and Stochastic Mechanics II**
- 6-4-1: Robot Control I**
- 6-4-2: Robot Control II**
- 6-4-3: Robot Design I**
- 6-4-4: Robot Design II**
- 6-4-5: Mechanism Design I**
- 6-4-6: Mechanism Design II**
- 6-4-7: Compliant Mechanisms**
- 6-5-1: Fluid-Structure Interaction I**
- 6-5-2: Fluid-Structure Interaction II**
- 6-6-1: Vibration, Noise Control and Damping Technologies I**
- 6-6-2: Vibration, Noise Control and Damping Technologies II**
- 6-6-3: Vibration, Noise Control and Damping Technologies III**
- 6-7-1: Dynamics and Control in Micro/Nano Engineering I**
- 6-8-1: Mechanics of Smart Structures**
- 6-8-2: Energy Harvesting and Transducers**
- 6-9-1: Novel Control of Dynamic System I**
- 6-9-2: Novel Control of Dynamic System II**
- 6-10-1: Multibody Dynamic Systems and Applications I**
- 6-10-2: Multibody Dynamic Systems and Applications II**
- 6-10-3: Multibody Dynamic Systems and Applications III**
- 6-11-1: Vibrations of Continuous Systems I**
- 6-11-2: Vibrations of Continuous Systems II**
- 6-12-1: Mobile Service Robots and Unmanned Vehicles I**
- 6-12-2: Mobile Service Robots and Unmanned Vehicles II**
- 6-13-1: Control Theory and Applications I**
- 6-15-1: Measurement and Analysis Techniques in Nonlinear Dynamics I**
- 6-17-1: Multi-Physics Dynamics-Control & Diagnostics-Prognostics of Structures I**
- 6-19-1: Renewable Energy, Structural Health Monitoring, and Distributed Structural Systems I**
- 6-20-1: Dynamics, Vibration, and Control for Structural Health Monitoring Applications I**

ACKNOWLEDGMENT

Track Organizers

Dumitru Caruntu, *University of Texas Rio Grande Valley, United States*
Bogdan Epureanu, *University of Michigan, United States*
Marco Amabili, *McGill University, Canada*

Topic Organizers

Dumitru Caruntu, *University of Texas Rio Grande Valley, United States*
Bogdan Epureanu, *University of Michigan, United States*
Marco Amabili, *McGill University, Canada*
Zhibin Lin, *North Dakota State University, United States*
Xiangqing Tangpong, *North Dakota State University, United States*
Ying Huang, *North Dakota State University, United States*
Hong Zhou, *Texas A&M University-Kingsville, United States*
Puren Ouyang, *Ryerson University, Canada*
Kostas Karazis, *Framatome Inc., United States*
Dennis Gottuso, *AREVA, United States*
Farbod Alijani, *Technical University of Delft, Netherlands*
Brian Painter, *Framatome Inc., United States*
Rinaldo Garziera, *University of Parma, Italy*
Eleonora Tubaldi, *University of Arizona, United States*
Huancai Lu, *Zhejiang University of Technology, China*
Chin-An Tan, *Wayne State University, United States*
Donald Michael McFarland, *University of Illinois at Urbana-Champaign, United States*
Hornsen(HS) Tzou, *Nanjing University of Aeronautics and Astronautics, China*
Hua Li, *Zhejiang University, China*
Lifeng Wang, *Nanjing University of Aeronautics and Astronautics, China*
C. Steve Suh, *Texas A&M University, United States*
Weidong Zhu, *University of Maryland, Baltimore County, United States*

Shanzhong (Shawn) Duan, *Saint Martin's University, United States*
William Prescott, *Siemens Product Lifecycle Management, United States*
Ilie Talpasanu, *Wentworth Institute of Technology, United States*
Marco Amabili, *McGill University, Canada*
Giuseppe Quaglia, *Politecnico Di Torino – DIMEAS, Italy*
Luca Bruzzone, *DIMEC – Università degli Studi di Genova, Italy*
Giulio Reina, *U Salento, Italy*
Renato Vidoni, *Free University of Bolzano, Italy*
Majura Selekwia, *North Dakota State University, United States*
Dale McDonald, *Gonzaga University, United States*
Pezhman Hassanpour, *Loyola Marymount University, United States*
Ioannis Georgiou, *Nat'l Tech University of Athens, Greece*
Francesco Romeo, *SAPIENZA Università di Roma, Italy*
Nikolaos Xiros, *University of New Orleans, Naval Arch & Marine Eng., United States*
C. Steve Suh, *Texas A&M University, United States*
Andrei Zagrai, *New Mexico Institute of Mining & Technology, United States*

Session Organizers

Christopher Jobes, *NIOSH, United States*
Ashkan Eslaminejad, *North Dakota State University, United States*
Sohel Anwar, *Indiana University-Purdue University Indianapolis, United States*
Isaac Elishakoff, *Florida Atlantic University, United States*
Ho-Hoon Lee, *Southeastern LA University, United States*
Yong Zhu, *Wilkes University, United States*
Yoram Halevi, *Tech-israel Institute of Tech, Israel*
Wooram Park, *University of Texas at Dallas, United States*
Vivek Sangwan, *Indian Institute of Technology Bombay, India*

Kiwon Sohn, *University of Hartford, United States*
He Shen, *California State University, Los Angeles, United States*
Yin-ping Chang, *Oakland University, United States*
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Naoufel Azouz, *University of Evry, France*
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Akintoye O. Oyelade, *University of Lagos, Nigeria*
Ashok Belegundu, *Pennsylvania State Univ, United States*
Saad Ilyas, *King Abdullah University of Science & Tech, Saudi Arabia*
Hornsen(HS) Tzou, *Nanjing University of Aeronautics and Astronautics, China*
C. Steve Suh, *Texas A&M University, United States*
Shanzhong (Shawn) Duan, *Saint Martin's University, United States*
Isaac Elishakoff, *Florida Atlantic University, United States*
Berkan Alanbay, *Virginia Tech, United States*
Ibrahim F Gebrel, *University of Western Ontario, Canada*
Aman Kumar, *Indian Institute of Technology Kharagpur, India*
Mustapha Fofana, *Worcester Polytechnic Inst, United States*
Giuseppe Quaglia, *Politecnico Di Torino – DIMEAS, Italy*
Jacob A. Farber, *University of Pittsburgh, United States*
Pezhman Hassanpour, *Loyola Marymount University, United States*
Nikolaos Xiros, *University of New Orleans, Naval Arch & Marine Eng., United States*
Andrei Zagrai, *New Mexico Institute of Mining & Technology, United States*

TRACK 6 DYNAMICS, VIBRATION, AND CONTROL

MONDAY, NOVEMBER 12

6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

6-4-1 Robot Control I

Third Floor, David L. Lawrence Convention Center, Room 307
9:45am–11:30am

Session Chair: Ho-Hoon Lee, *Southeastern Louisiana University, Hammond, LA, United States*

Session Co-Chair: Yong Zhu, *Wilkes University, Wilkes-Barre, PA, United States*

9:45am – Control of a Robotic Prosthetic Hand Using an EMG Signal Based Counter

Technical Paper Publication. IMECE2018-86032
Kyle Stanek, Nathan Barnhart, Yong Zhu, *Wilkes University, Wilkes-Barre, PA, United States*

10:06am – Dynamic Modeling and Control of the Hexapod Robot Using Matlab SimMechanics

Technical Paper Publication. IMECE2018-88226
Sameh I. Beaber, *Military Technical College, Cairo, Cairo, Egypt*, Abdelrahman Zaghoul, *McMaster University, Hamilton, ON, Canada*, Mohamed Kamel, Wessam Hussein, *Military Technical College, Cairo, Egypt*

10:27am – Simultaneously Satisfying Multi-Objective Design of Structural and Control Systems Based on Consideration of Uncertainty by Set-Based Approach

Technical Paper Publication. IMECE2018-86757
Haruo Ishikawa, Naoko Sasaki, *The Electro-Communications, Chofu, Japan*

10:48am – Control for a Two-Link Planar Robot With an Actuated Tail

Technical Paper Publication. IMECE2018-86827
Xinjia Yu, *Carnegie Mellon University, Pittsburgh, PA, United States*, Mark Bedillion, *Carnegie Mellon University, Gibsonia, PA, United States*

11:09am – A Path-Generating Motion Control Scheme for a Mobile Robot in the Environment of Obstacles

Technical Paper Publication. IMECE2018-86524
Ho-Hoon Lee, *Southeastern Louisiana University, Hammond, LA, United States*

6-4-7 Compliant Mechanisms

Third Floor, David L. Lawrence Convention Center, Room 308
9:45am–11:30am

Session Chair: Hong Zhou, *Texas A&M University-Kingsville, Kingsville, TX, United States*

Session Co-Chair: Ayse Tekes, *Kennesaw State University, Marietta, GA, United States*

9:45am – Compliant Translational Double Exact Dwell Mechanism

Technical Paper Publication. IMECE2018-86073
Ayse Tekes, Hongkuan Lin, *Kennesaw State University, Marietta, GA, United States*

10:06am – On Novel Dynamic Displacement Amplification Using Compliant Mechanisms

Technical Paper Publication. IMECE2018-87638
Abhijit Tanksale, Prasanna Gandhi, *Indian Institute of Technology, Bombay, Mumbai, Maharashtra, India*

10:27am – Reduction of Jerk Through Optimization of a Knee Assistive Device Designed Using Four-Bar Controlled Compliance Actuator

Technical Paper Publication. IMECE2018-87012
Saikat Sahoo, Aditya Jain, Dilip Pratihar, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

10:48am – Large Deformation Analysis and Experiments With Double Parallelogram Compliant Mechanisms

Technical Paper Publication. IMECE2018-87604
Abhijit Tanksale, Prasanna Gandhi, *Indian Institute of Technology, Bombay, Mumbai, Maharashtra, India*

11:09am – Synthesizing Bidirectional Constant Torque Compliant Mechanisms Using Precompressed Beams

Technical Paper Publication. IMECE2018-86469
Monik Thanaki, Hong Zhou, *Texas A&M University-Kingsville, Kingsville, TX, United States*

6-12 MOBILE SERVICE ROBOTS AND UNMANNED VEHICLES

6-12-1 Mobile Service Robots and Unmanned Vehicles I

Third Floor, David L. Lawrence Convention Center, Room 315
9:45am–11:30am

Session Chair: Giuseppe Quaglia, *Politecnico di Torino, Torino, Italy*

9:45am – Rese_Q: UGV for Rescue Tasks Functional Design

Technical Paper Publication. IMECE2018-86395
Giuseppe Quaglia, Paride Cavallone, *Politecnico di Torino, Torino, Italy*

10:06am – Image Identification of a Moving Object Based on an Improved Canny Edge Detection Algorithm
Technical Paper Publication. IMECE2018-86792
Yang Liu, Lingyu Sun, Lijun Li, Yiben Zhang, Beihang University, Beijing, China, Zongmiao Dai, Zhenkai Xiong, Zhengzhou Electromechanical Engineering Research Institute, Zhengzhou, China

10:27am – GA Optimized Formation Control of Autonomous Underwater Vehicles
Technical Paper Publication. IMECE2018-87299
Mansour Karkoub, Texas A&M University, College Station, TX, United States, Lotfi Romdhane, American University of Sharjah, Sharjah, United Arab Emir.

10:48am – Performance Analysis of UAV Visual Landmark Tracking Under Rapid Motion
Technical Paper Publication. IMECE2018-88345
Eric Jacobson, Akin Tatoglu, University of Hartford, West Hartford, CT, United States

11:09am – On Self-Driving Car Safety: Occupancy Map Modification With Rapid Emergency Vehicle Detection
Technical Paper Publication. IMECE2018-88492
Akin Tatoglu, Eoin King, Jarrett Lagler, University of Hartford, West Hartford, CT, United States

6-13 CONTROL THEORY AND APPLICATIONS

6-13-1 Control Theory and Applications I
Third Floor, David L. Lawrence Convention Center, Room 309
9:45am–11:30am

Session Chair: Jacob A. Farber, *University of Pittsburgh, Pittsburgh, PA, United States*

9:45am – Improving Boiler Efficiency Using PLC Controller
Technical Paper Publication. IMECE2018-86100
Hung Tang, TAI Engineering, York, PA, United States, Ma'moun Abu-Ayyad, Penn State Harrisburg, Middletown, PA, United States

10:00am – Dynamic Exposure Model of Scanning Beam Interference Lithography
Technical Paper Publication. IMECE2018-86979
Sen Lu, Kaiming Yang, Yu Zhu, Leijie Wang, Ming Zhang, Tsinghua University, Beijing, China

10:15am – Using Multiple-Model Adaptive Estimation and System Identification for Fault Detection in Nuclear Power Plants
Technical Paper Publication. IMECE2018-87616
Jacob A. Farber, Daniel G. Cole, University of Pittsburgh, Pittsburgh, PA, United States

10:30am – Intelligent Adaptive Control for Anti-Lock Braking System
Technical Paper Publication. IMECE2018-87659
Wafa Batayneh, Jordan University of Science and Technology, Irbid, Jordan, Mohammad Jaradat, American University of Sharjah, Sharjah, United Arab Emir., Ahmad Bataineh, Jordan University of Science and Technology, Irbid, Jordan

10:45am – A Game-Theoretic Approach to Defending Nuclear Instrumentation and Control Systems From Cyber-Threats
Technical Paper Publication. IMECE2018-87713
Lee T. Maccarone, Daniel G. Cole, University of Pittsburgh, Pittsburgh, PA, United States

11:00am – Application of the Levenberg-Marquardt Algorithm to Control a Gough-Stewart Platform
Technical Presentation. IMECE2018-89399
David Gordon, Kevin Anderson, Nolan Tsuchiya, California State Polytechnic University, Pomona, Pomona, CA, United States

6-15 MEASUREMENT AND ANALYSIS TECHNIQUES IN NONLINEAR DYNAMIC

6-15-1 Measurement and Analysis Techniques in Nonlinear Dynamics I
Third Floor, David L. Lawrence Convention Center, Room 311
9:45am–11:30am

Session Chair: Pezhman Hassanpour, *Loyola Marymount University, Los Angeles, CA, United States*

9:45am – Effect of Eccentricity on the Nonlinear Dynamic Behavior of a Cam and Follower Mechanism With Clearance
Technical Paper Publication. IMECE2018-86202
Louay S. Yousuf, Auburn University, Walled Lake, MI, United States, Dan Marghitu, Auburn University, Auburn, AL, United States

10:06am – Numerical Modeling and Analysis of Nonlinear Dynamic Response for a Bolted Joint Beam Considering Interface Frictional Contact
Technical Paper Publication. IMECE2018-86743
Dongwu Li, Chao Xu, Northwestern Polytechnical University, Xi'an, Shaanxi, China, Dong Wang, China Academy of Engineering Physics, Mianyang, China, Lihua Wen, Northwestern Polytechnical University, Xi'an, Shaanxi, China

10:27am – An Improved Analytical Model of Friction and Ball Motion in Linear Ball Bearings: With Application to Ball-To-Ball Contact Prediction
Technical Paper Publication. IMECE2018-88033
Bo Lin, Molong Duan, Chinedum Okwudire, University of Michigan, Ann Arbor, MI, United States, Jason Wou, Ford Motor Company, Dearborn, MI, United States

10:48am – Dynamic Characteristics of Resonant Beams With Passive Thermal Stress Regulators
Technical Paper Publication. IMECE2018-88536
Tyler Kellar, Pezhman Hassanpour, Loyola Marymount

11:09am – Approximate Response of Beam-Type Resonant Biosensors

Technical Paper Publication. IMECE2018-88535
Pezhman Hassanpour, *Loyola Marymount University, Los Angeles, CA, United States*

6-17 MULTI-PHYSICS DYNAMICS-CONTROL & DIAGNOSTICS-PROGNOSTICS OF STRUCTURES

6-17-1 Multi-Physics Dynamics-Control & Diagnostics-Prognostics of Structures I Third Floor, David L. Lawrence Convention Center, Room 310 9:45am–11:30am

Session Chair: Nikolaos Xiros, *University of New Orleans, Naval Arch & Marine Eng, New Orleans, LA, United States*

9:45am – Toward a Contactless Hydrokinetic Energy Harvester: A Computational Magnetic Field Estimation

Technical Paper Publication. IMECE2018-87063
Georgios Tsakyridis, Nikolaos Xiros, *University of New Orleans, New Orleans, LA, United States*, **Michael Bernitsas**, *University of Michigan, Ann Arbor, MI, United States*

10:06am – Research on a Mechanical Model of the Connecting and Sliding Parts in Motion for a Reciprocating Compressor

Technical Paper Publication. IMECE2018-87392
Yu Mizobe, Takashi Saito, *Yamaguchi University, Ube/Yamaguchi, Japan*, **Yoshifumi Mori**, *Tokuyama Corporation, Yamaguchi, Japan*

10:27am – Study on Dependency of Dynamic Properties in a Rolling Roller on Fine Coal Upon the Running Velocity

Technical Paper Publication. IMECE2018-87416
Kentaro Oshiro, *Yamaguchi University, Ube/Yamaguchi, Japan*, **Akira Kobayashi, Kazuhiro Watanabe, Emi Ohno, Makoto Echizenya**, *IHI Corporation, Koto-ku, Japan*, **Katsuhide Fujita**, *National Institute of Technology, Ube College, Ube, Japan*, **Takashi Saito**, *Yamaguchi University, Ube/Yamaguchi, Japan*

10:48am – Shape Memory Alloy Based Rotational Actuator

Technical Paper Publication. IMECE2018-87646
Nicholas Hofmann, Michael Hennessey, *University of St. Thomas, St. Paul, MN, United States*

11:09am – System Identification for Control of a Bow Thruster With Brushless Motor and Shaft-Less Propeller

Technical Paper Publication. IMECE2018-88029
Priyatham Sanjeeva Reddy Ramidi, Nikolaos Xiros, *University of New Orleans, New Orleans, LA, United States*, **Stavros Lalizas, Anastasios Papavasileiou, Vasileios Douvris, Nikolas Theodorou, Alexandros Lalizas**, *LALIZAS Hellas, Piraeus, Piraeus, Greece*

6-2 GENERAL

6-2-1 Dynamics, Vibration, and Control-I Third Floor, David L. Lawrence Convention Center, Room 308 1:45pm–3:30pm

Session Chair: Christopher Jobes, *NIOSH, Pittsburgh, PA, United States*

Session Co-Chair: Ashkan Eslaminejad, *North Dakota State University, Fargo, ND, United States*

1:45pm – Identification of Lug Excitation Force by Using Three-Dimensional Rigid Ring Model

Technical Presentation. IMECE2018-86339
Katsuhide Fujita, *National Institute of Technology, Ube College, Ube, Japan*, **Takashi Saito**, *Yamaguchi University, Ube/Yamaguchi, Japan*, **Mitsugu Kaneko**, *Yanmar Co., Ltd., Maibara, Japan*

2:06pm – Development of Vehicle Seat by Embedding Urethane Within Air Cell

Technical Paper Publication. IMECE2018-86389
Shinichiro Ota, Yuji Nakamura, *Okayama Prefectural University, Okayama, Japan*

2:27pm – Dynamic Modeling System to Determine Stopping Distances of Mobile Underground Coal Equipment

Technical Paper Publication. IMECE2018-86422
Christopher Jobes, Jacob Carr, *NIOSH, Pittsburgh, PA, United States*

2:48pm – A Comparative Study of Rapid Quadrupedal Sprinting and Turning Dynamics on Different Terrains and Conditions: Racing Greyhounds Galloping Dynamics

Technical Paper Publication. IMECE2018-87144
Hasti Hayati, *University of Technology Sydney, Sydney, NSW, Australia*, **Paul Walker, Fatemeh Mahdavi**, *University of Technology Sydney, Ultimo, NSW, Australia*, **Robert Stephenson**, *University of Technology Sydney, Sydney, NSW, Australia*, **Terry Brown**, *University of Technology Sydney, Ultimo, NSW, Australia*, **David Eager**, *University of Technology Sydney, Sydney, NSW, Australia*

3:09pm – Numerical Research on Machining Stability Subject to Delayed PID Control

Technical Paper Publication. IMECE2018-87475
Mingjie Li, Xiaojian Zhang, Yakun Xie, *Huazhong University of Science and Technology, Wuhan City, China*

6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

6-4-2 Robot Control II

Third Floor, David L. Lawrence Convention Center, Room 307
1:45pm–3:30pm

Session Chair: Yoram Halevi, *Technion-Israel Institute of Technology, Technion City, Haifa, Israel*

Session Co-Chair: Wooram Park, *University of Texas at Dallas, Richardson, TX, United States*

1:45pm – Brain-Computer Interface Application in Robotic Gripper Control

Technical Paper Publication. IMECE2018-86274
Briana Landavazo, Vidya Nandikolla, *California State University Northridge, Northridge, CA, United States*

2:06pm – Minimum Energy Control of Redundant Systems Using Evolutionary Bi-Level Optimization

Technical Paper Publication. IMECE2018-88709
Uriel Nusbaum, *Technion, Haifa, Israel*, **Miri Weiss Cohen,** *Braude College of Engineering, Karmiel, Israel*, **Yoram Halevi,** *Technion-Israel Institute of Technology, Technion City, Haifa, Israel*

2:27pm – Light-Powered Soft Robots

Technical Presentation. IMECE2018-89146
Shengqiang Cai, *University of California San Diego, La Jolla, CA, United States*

2:48pm – Dynamic Analysis for Motor-Powered Periotomes in Dentistry

Technical Paper Publication. IMECE2018-88196
Jianping Lin, Om A. Sharma, Wooram Park, *University of Texas at Dallas, Richardson, TX, United States*

3:09pm – Functional Design of a Robust Dynamic Position and Data Acquisition System

Technical Paper Publication. IMECE2018-87993
James Meyers, *U.S. Coast Guard, Quincy, MA, United States*, **Tooran Emami,** *U.S. Coast Guard Academy, East Lyme, CT, United States*

6-8 SMART STRUCTURES AND STRUCTRONIC SYSTEMS: SENSING, ENERGY GENERATION AND CONTROL

6-8-1 Mechanics of Smart Structures

Third Floor, David L. Lawrence Convention Center, Room 309
1:45pm–3:30pm

Session Chair: Hornsen (HS) Tzou, *Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

1:45pm – Development of Soft Body Rescue-Bot Using 3D Printing

Technical Paper Publication. IMECE2018-86860
Cody Lewis, Jared Legg, Minchul Shin, *Georgia Southern University, Statesboro, GA, United States*

2:00pm – Inductance of Twisted Nylon Actuators With Conductive Wires

Technical Presentation. IMECE2018-87214
Hua Li, Haochen Ye, K.M. Hu, *Zhejiang University, Hangzhou, China*

2:15pm – Structural Self-Sensing by Capacitance Measurement

Technical Presentation. IMECE2018-87748
Deborah D.L. Chung, Kairong Shi, Yulin Wang, Asma A. Eddib, *University at Buffalo, State University of New York, Buffalo, NY, United States*

2:30pm – Study on Large Deformation of Laminated Piezoelectric Rectangular Plate

Technical Paper Publication. IMECE2018-88599
Lihua Chen, Shoujie Cui, *Beijing University of Technology, Beijing, China*, **Xiaozhi Zhang,** *University of Vermont, Burlington, VT, United States*, **Wei Zhang,** *Beijing University of Technology, Beijing, China*

2:45pm – Frequency Control of Simply Supported Beam by Light-Activated Shape Memory Polymers

Technical Presentation. IMECE2018-88814
Yang Yunze, Yuan Jihai, Fan Mu, *Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

3:00pm – Mesh-Free Vibration Analysis of Suspended Strain Gradient Nano-Plate

Technical Paper Publication. IMECE2018-87428
Wang Li, Lifeng Wang, Jingnong Jiang, *Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

6-9 NOVEL CONTROL OF DYNAMIC SYSTEM AND

6-9-1 Novel Control of Dynamic System I

Third Floor, David L. Lawrence Convention Center, Room 310
1:45pm–3:30pm

Session Chair: C. Steve Suh, *Texas A&M University, College Station, TX, United States*

1:45pm – A Novel Nonlinear Time-Frequency Strategy for Stabilizing Inverted Pendulum Cart System

Technical Paper Publication. IMECE2018-86758
Zilong Zhang, C. Steve Suh, *Texas A&M University, College Station, TX, United States*

2:06pm – An Experimental Study of Periodic Motions in a Duffing Oscillator

Technical Paper Publication. IMECE2018-86833
Yu Guo, *Midwestern State University, Wichita Falls, TX, United States*, **Albert Luo,** *Southern Illinois University, Edwardsville, IL, United States*, **Abigail Reyes, Zeltzin Reyes,** *Midwestern State University, Wichita Falls, TX, United States*

2:27pm – Period Motions in a Periodically Forced, Damped Double Pendulum

Technical Paper Publication. IMECE2018-86849
Chuan Guo, Albert Luo, *Souther Edwards*

2:48pm – On the Proper Description of Complex Network Dynamics

Technical Paper Publication. IMECE2018-88051
Chun-Lin Yang, C. Steve Suh, *Texas A&M University, College Station, TX, United States*

3:09pm – An Optimization Model of High-Speed and High-Precision Machining Based on Model Predictive Control

Technical Paper Publication. IMECE2018-88326
Jing Zhang, Jiexiong Ding, Qingzhao Li, Qicheng Ding, Zhong Jiang, Li Du, Wei Wang, *University of Electronic Science and Technology of China, Chengdu, China*

6-12 MOBILE SERVICE ROBOTS AND UNMANNED VEHICLES

6-12-2 Mobile Service Robots and Unmanned Vehicles II

Third Floor, David L. Lawrence Convention Center, Room 315
1:45pm–3:30pm

Session Chair: Giuseppe Quaglia, *Politecnico di Torino, Torino, Italy*

1:45pm – Iterative Modeling of a Small Underwater Tethered Remotely Operated Vehicle

Technical Paper Publication. IMECE2018-88501
Andrés F. Aldana, Helio Sneyder Esteban Villegas, *Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia*, Sebastian Roa Prada, *Universidad Autónoma de Bucaramanga, Bucaramanga, Santander, Colombia*

2:06pm – Design of a Robust Yaw Rate Controller Using Sliding Mode Control and Extended State Observer for Navigation of an Autonomous Ground Vehicle

Technical Paper Publication. IMECE2018-88752
Suraj Borate, *Defence Institute of Advanced Technology, Pune, India*, Shubhashisa Sahoo, *Center for Artificial Intelligence and Robotics, Bangalore, India*, Devika K.B., Shankar Coimbatore Subramanian, *Indian Institute of Technology, Madras, Chennai, India*, K.K. Mangrulkar, *Defence Institute of Advanced Technology, Pune, India*

2:27pm – Low-Light Pedestrian Recognition System

Technical Presentation. IMECE2018-88835
Fei Lin, John E. Ball, *Mississippi State University, Starkville, MS, United States*

2:48pm – Advances in Multirobot Adaptive Navigation of Environmental Scalar Fields

Technical Presentation. IMECE2018-88910
Christopher Kitts, *Santa Clara University, Santa Clara, CA, United States*

6-19 RENEWABLE ENERGY, STRUCTURAL HEALTH MONITORING, AND DISTRIBUTED STRUCTURAL SYSTEMS

6-19-1 Renewable Energy, Structural Health Monitoring, and Distributed Structural Systems I

Third Floor, David L. Lawrence Convention Center, Room 311
1:45pm–3:30pm

Session Chair: Weidong Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*

1:45pm – Effectiveness of Using Mixed Coordinates in Modeling Wind Turbines

Technical Paper Publication. IMECE2018-87493
Ayman A. Nada, Ali S. Al-Shahrani, *Jazan University, Jazan, Saudi Arabia*

2:06pm – Effect of Damage on the Normalized Frequency of Beam-Like Structures Using Vibration Based Technique

Technical Presentation. IMECE2018-88788
Putti Srinivasa Rao, *Andhra University, Visakhapatnam, Andhra Pradesh, India*, Siva Sankara Babu Chinka, *Lakireddy Balireddy College of Engineering, Mylavaram, India*, Balakrishna Adavi, *SRKR College of Engineering, Bhimavaram, India*

2:27pm – Damage Recognition in Plate-Form Structures Using Changes in Modal Strain Energy

Technical Presentation. IMECE2018-88798
Putti Srinivasa Rao, *Andhra University, Visakhapatnam, Andhra Pradesh, India*, Ramesh Lanka, *Gudivalluru Engineering College, Gudivalluru, India*

2:48pm – Proof Mass Study for Low Frequency Vibration Energy Harvesting of Piezoelectric Cantilever

Technical Paper Publication. IMECE2018-88163
Lu Wang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, Libo Zhao, Dejiang Lu, Chen Jia, Zhuangde Jiang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

3:09pm – Absolute Vibration Suppression (AVS) Control for Fractional Order Systems

Technical Presentation. IMECE2018-88710
Yoram Halevi, *Technion-Israel Institute of Tech, Technion City, Haifa, Israel*

6-2 GENERAL

6-2-2 Dynamics, Vibration, and Control-II

Third Floor, David L. Lawrence Convention Center, Room 308
3:45pm–5:30pm

Session Chair: Sohel Anwar, *Indiana University-Purdue University Indianapolis, Carmel, IN, United States*

3:45pm – Sommerfeld Effect and Passive Energy Reallocation in a Self-Synchronizing System

Technical Paper Publication. IMECE2018-87559
Anubhab Sinha, Saurabh Kumar Bharti, Arun Kumar Samantaray, Ranjan Bhattacharyya, *Indian Institute of Technology Kharagpur*

4:06pm – Finite Element Analysis (FEA) for Optimization the Design of a Baja SAE Chassis

Technical Paper Publication. IMECE2018-87564
Jessica Gissella Maradey Lazaro, Helio Sneyder Esteban Villegas, Braulio José Blanco Caballero, Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia

4:27pm – A Virtual Sensor for Soot Load Estimation in Diesel Particulate Filters

Technical Paper Publication. IMECE2018-88094
Pratik V. Magar, Afshin Izadian, Indiana University-Purdue University Indianapolis, Indianapolis, IN, United States, Sohail Anwar, Indiana University-Purdue University Indianapolis, Carmel, IN, United States

4:48pm – Analysis of Magneto Electro Elastic Circular Plates Based on DQ Method

Technical Presentation. IMECE2018-88782
Saeed Amir, University of Kashan, Kashan, Isfahan, Iran, Abbasn Loghman, Ehsan Arshid, Kashan University, Kashan, Iran, Ali Haghshenas, Louisiana State University, Louisiana State, LA, United States

5:09pm – An Efficient Layerwise Theory Based Facet Shell Element for Modeling of Composite and Sandwich Shells With Multiple Delaminations Using a Hybrid Continuity Method

Technical Presentation. IMECE2018-89558
Adnan Ahmed, Santosh Kapuria, Indian Institute of Technology Delhi, New Delhi, India

6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

6-4-3 Robot Design I

Third Floor, David L. Lawrence Convention Center, Room 307 3:45pm–5:30pm

Session Chair: Vivek Sangwan, Indian Institute of Technology Bombay, Mumbai, India

Session Co-Chair: Kiwon Sohn, University of Hartford, West Hartford, CT, United States

3:45pm – Development of Lower Body for Vehicle Driving Robot, HART

Technical Paper Publication. IMECE2018-86470
Kiwon Sohn, Mark Markiewicz, Stefan Keilich, University of Hartford, West Hartford, CT, United States

4:06pm – An Accurate On-Line Correction Strategy for Gravity Compensation Aiming at Teaching by Touch of Collaborative Robots

Technical Paper Publication. IMECE2018-86649
Yunfei Dong, Tianyu Ren, Dan Wu, Ken Chen, Tsinghua University, Beijing, Beijing, China

4:27pm – Optimal Mechatronic Design of a Quadruped Robot With Compliant Legs

Technical Paper Publication. IMECE2018-88055
Jaime Arcos-Legarda, Khunsa Hisham, Indiana University-Purdue University Indianapolis, Indianapolis, IN, United States, Sohail Anwar, Indiana University-Purdue University Indianapolis, Carmel, IN, United States, Andres Tovar, Indiana University-Purdue University Indianapolis, Indianapolis, IN, United States

4:48pm – Paper-Based Robotic Systems With Stackable Inflatable Actuators

Technical Presentation. IMECE2018-89611
Xiyue Zou, Michael Yang, Cora LoPresti, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Smit Shukla, Birla Institute of Technology, Mesra, India, Tongfen Liang, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Meriem Akin, Braunschweig University of Technology, Braunschweig, Germany, Aaron Mazzeo, Rutgers, The State University of New Jersey, Piscataway, NJ, United States

5:09pm – Study of Symmetric Solutions of an Underactuated Bipedal Robot

Technical Paper Publication. IMECE2018-87723
Prachi Shah, Vivek Sangwan, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India

6-8 SMART STRUCTURES AND STRUCTRONIC SYSTEMS: SENSING, ENERGY GENERATION AND CONTROL

6-8-2 Energy Harvesting and Transducers

Third Floor, David L. Lawrence Convention Center, Room 309 3:45pm–5:30pm

Session Chair: Hornsen (HS) Tzou, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China

3:45pm – Multi-Stable Magnetic Spring-Based Energy Harvester Subject to Harmonic Excitation: Comparative Study and Experimental Evaluation

Technical Paper Publication. IMECE2018-86157
Hieu Nguyen, Hamzeh Bardaweel, Louisiana Tech University, Ruston, LA, United States

4:06pm – Study on Motor-Driven Gyroscopic Generator: Part 1 – Characteristics at Constant Velocity

Technical Paper Publication. IMECE2018-86390
Hiroshi Hosaka, Yoshinori Oonishi, Yuki Tajima, University of Tokyo, Kashiwa-City, Chiba, Japan, Akira Yamashita, Seigi Kanagata Co., Ltd., Shiroy-City, Chiba Prefecture, Japan

4:27pm – Study on Motor-Driven Gyroscopic Generator: Part 2 – Self-Acceleration by Power Feedback

Technical Paper Publication. IMECE2018-86444
Yuki Tajima, Yoshinori Oonishi, Hiroshi Hosaka, University of Tokyo, Kashiwa-City, Chiba, Japan

4:48pm – Energy Partition of Coupled and High Frequency Vibrations of Quartz Crystal Plates

Technical Presentation. IMECE2018-88333

Qi Huang, Rongxing Wu, Longtao Xie, *Ningbo University, Ningbo, Zhejiang, China*, Guoliang Huang, *University of Missouri, Columbia, MO, United States*, Jianke Du, Ji Wang, *Ningbo University, Ningbo, Zhejiang, China*

5:09pm – Control-Based Power Amplification in Thermoacoustic-Piezoelectric Energy Harvesting Devices

Technical Presentation. IMECE2018-88125

Jesse Callanan, Mostafa Nouh, *University at Buffalo, State University of New York, Buffalo, NY, United States*

6-9 NOVEL CONTROL OF DYNAMIC SYSTEM AND

6-9-2 Novel Control of Dynamic System II

Third Floor, David L. Lawrence Convention Center, Room 310
3:45pm–5:30pm

Session Chair: C. Steve Suh, *Texas A&M University, College Station, TX, United States*

3:45pm – Periodic Motions in a First-Order, Time-Delayed, Nonlinear System

Technical Paper Publication. IMECE2018-86824

Siyuan Xing, Albert Luo, *Southern Illinois University Edwardsville, Edwardsville, IL, United States*

4:06pm – Periodic Motions in a Van Der Pol Oscillator

Technical Paper Publication. IMECE2018-86842

Yeyin Xu, Albert Luo, *Southern Illinois University Edwardsville, Edwardsville, IL, United States*

4:27pm – Period Motions and Stability in a Nonlinear Spring Pendulum

Technical Paper Publication. IMECE2018-86862

Albert Luo, Yaoguang Yuan, *Southern Illinois University Edwardsville, Edwardsville, IL, United States*

4:48pm – On the Temporal Network Analysis With Link Prediction

Technical Paper Publication. IMECE2018-88101

Bin Wu, C. Steve Suh, *Texas A&M University, College Station, TX, United States*

5:09pm – Low Cost Robotic Arm Manipulator Controller With Single Stage Fluid Valves

Technical Paper Publication. IMECE2018-88435

Claudio Campana, Akin Tatoglu, *University of Hartford, West Hartford, CT, United States*

6-11 VIBRATIONS OF CONTINUOUS SYSTEMS

6-11-2 Vibrations of Continuous Systems II

Third Floor, David L. Lawrence Convention Center, Room 311
3:45pm–5:30pm

Session Chair: Ibrahim F. Gebrel, *University of Western Ontario, London, ON, Canada*

Session Co-ChairS: Aman Kumar, *Indian Institute of Technology Kharagpur, Khargapur, India*, Mustapha Fofana, *Worcester Polytechnic Institute, Worcester, MA, United States*

3:45pm – Dynamic Analysis and Design of a Novel Ring-Based Vibratory Energy Harvester

Technical Paper Publication. IMECE2018-87164

Ibrahim F. Gebrel, *University of Western Ontario, London, ON, Canada*, Ligang Wang, *Harbin Engineering University, Harbin, Heilongjiang, China*, Samuel Asokanathan, *University of Western Ontario, London, ON, Canada*

4:06pm – Modal Identification and Nonlinear Vibration of Flexible Manipulator With Revolute Pair Incorporating Generic Payload

Technical Paper Publication. IMECE2018-88527

Pravesh Kumar, Barun Pratiher, *Indian Institute of Technology Jodhpur, Jodhpur, Rajasthan, India*

4:27pm – Evaluation of Vibration Performance of Overhead Line Conductor and Insulator String for 800 KV HVDC System

Technical Presentation. IMECE2018-86105

Gnanavel B.K., *Saveetha Engineering College, Chennai, Tamilnadu, India*, Anantha Babu M.D., *Vibration Laboratory Mechanical Engineering Division, Bangalore, Karnataka, India*, Raja Rajeswari N., *Lakshmanan Singaram, Saveetha Engineering College, Chennai, Tamilnadu, India*, Kamesh K., *Murugappa Polytechnic College, Chennai, Tamilnadu, India*

4:48pm – Generation of Traveling Waves in Beams Using Search Based Optimization

Technical Presentation. IMECE2018-88719

Aman Kumar, Anirvan Dasgupta, *Indian Institute of Technology Kharagpur, Khargapur, India*

5:09pm – Impact Vibration Analysis of a Continuous System Colliding With Elastic Bodies at an Arbitrary Position

Technical Presentation. IMECE2018-88742

Yuji Suzuki, Tatsuhito Aihara, *Hosei University, Tokyo, Tokyo, Japan*

TUESDAY, NOVEMBER 13

6-1 PLENARY PRESENTATIONS

6-1-1 Dynamics, Vibration, and Control Plenary

Third Floor, David L. Lawrence Convention Center, Room 303
8:00am–8:45am

8:00am – Complex Modal Decomposition for Traveling Waves and Nonsynchronous Oscillations

Plenary Presentation. IMECE2018-90097

Brian Feeny, *Michigan State University, East Lansing, MI, United States*

6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS, AND STRUCTURES

6-4-4 Robot Design II

Third Floor, David L. Lawrence Convention Center, Room 307
10:00am–11:45am

Session Chair: He Shen, *California State University, Los Angeles, Los Angeles, CA, United States*

Session Co-Chair: Kiwon Sohn, *University of Hartford, West Hartford, CT, United States*

10:00am – Service Robot Design for Uses in Human Centered Environments

Technical Paper Publication. IMECE2018-86479

Kiwon Sohn, Ethan Morris, Obioma Ulebor, Thomas Currier, Shaun Merrill, *University of Hartford, West Hartford, CT, United States*

10:21am – Motion Planning for Handspring Maneuver Using a Two Link Robot

Technical Paper Publication. IMECE2018-87809

Raunaq Bhirangi, Vivek Sangwan, *Indian Institute of Technology Bombay, Mumbai, Maharashtra, India*

10:42am – Low Cost Optical Mechanical System for Human Robot Interaction

Technical Paper Publication. IMECE2018-87885

Yulai Weng, Andrew Specian, Mark Yim, *University of Pennsylvania, Philadelphia, PA, United States*

11:03am – Enhancing the Path Planning Generation of a Five DOF Manipulator Using Low-Cost Camera-Laser Triangulation Technique

Technical Paper Publication. IMECE2018-88144

Ahmed Y. AbdelHamid, *Military Technical College, Cairo, Egypt*, Maged M. Abou Elyazed, *Technical Research Center, Cairo, Egypt*, Mohamed H. Mabrouk, Mootaz E. Abo Elnor, *Military Technical College, Cairo, Egypt*

11:24am – Development and Analysis of Robotic Arms for Humanoid Melo

Technical Paper Publication. IMECE2018-87987

He Shen, *California State University, Los Angeles, Los Angeles, CA, United States*, Salvador Rojas, *California State University, Los Angeles, Whittier, CA, United States*, Eduardo Molina, *Francisco Moxo Galicia, Ni Li, California State University, Los Angeles, Los Angeles, CA, United States*

6-5 FLUID-STRUCTURE INTERACTION

6-5-1 Fluid-Structure Interaction I

Third Floor, David L. Lawrence Convention Center, Room 310
10:00am–11:45am

Session Chair: Marco Amabili, *McGill University, Montreal, QC, Canada*

10:00am – Developing an Advance Tire Hydroplaning Model Using Co-Simulation of Fully Coupled FEM and CFD Codes to Estimate Cornering Force

Technical Paper Publication. IMECE2018-86581

Ashkan Nazari, *Virginia Tech, Blacksburg, VA, United States*, Lu Chen, *Francine Battaglia, University at Buffalo, State University of New York, Buffalo, NY, United States*, Saied Taheri, *Virginia Tech, Blacksburg, VA, United States*

10:21am – Experimental and CFD Investigation of Aerodynamic Forces and Moments in a Linear Turbine Blade Cascade

Technical Paper Publication. IMECE2018-86667

Vaclav Slama, *Doosan Skoda Power, Pilsen, Czech Republic*, Jiri Ira, *NUM Solution s.r.o., Prague, Czech Republic*, Petr Eret, *University of West Bohemia, Pilsen, Czech Republic*, Bartolomej Rudas, *Doosan Skoda Power, Pilsen, Czech Republic*, Ales Macalka, *NUM Solution, Prague, Czech Republic*, Volodymyr Tsybalyuk, *University of West Bohemia, Pilsen, Czech Republic*

10:42am – Effect of Speed on the Performance Characteristics of Non-Recessed Worn Hybrid Conical Journal Bearing for Different Semi Cone Angles

Technical Paper Publication. IMECE2018-87734

Sanjay Pawar, Vikas Phalle, Sangram Patil, Veermata Jijabai Technological Institute, *Mumbai, Maharashtra, India*

11:03am – Experiments on Nonlinear Vibrations of a Nuclear Fuel Rod in Air and in Water

Technical Presentation. IMECE2018-88755

Marco Amabili, *Prabakaran Balasubramanian, Giovanni Ferrari, McGill University, Montreal, QC, Canada*, Kostas Karazis, *Framatome, Lynchburg, VA, United States*, Brian Painter, *Framatome Ltd., Lynchburg, VA, United States*

11:24am – A Numerical Study of VIV Suppression Using a Rotative Non-Linear Vibration Absorber (NVA) and a Wake-Oscillator Model

Technical Presentation. IMECE2018-88767

Tatiana Ueno, *University of São Paulo, Lins, São Paulo, Brazil*, Guilherme Franzini, *University of São Paulo, São Paulo, São Paulo, Brazil*

6-6 VIBRATION, NOISE CONTROL AND DAMPING TECHNOLOGIES

6-6-1 Vibration, Noise Control and Damping Technologies I

Third Floor, David L. Lawrence Convention Center, Room 308
10:00am–11:45am

Session Chair: Robley G. Kirk, *Virginia Tech, Christiansburg, VA, United States*

10:00am – Maxwell-Voigt and Voigt Models for Vibration Isolation: Influence of Fractional Damping and Time Delay

Technical Paper Publication. IMECE2018-86089

Sudhir Kaul, *Western Carolina University, Cullowhee, NC, United States*

10:21am – A Vertical Seismometer With Build-in Retroreflector for Absolute Gravimetry

Technical Paper Publication. IMECE2018-86136

Meiying Guo, Kang Wu, Jiamin Yao, Jin Qian, Lijun Wang, *Tsinghua University, Beijing, China*

10:42am – Improved Design Tool for Thermal Synchronous Instability

Technical Paper Publication. IMECE2018-86142

Robley G. Kirk, *Virginia Tech, Christiansburg, VA, United States*, **Wen Jeng Chen**, *Eigen Technologies, Inc., Davidson, NC, United States*

11:03am – An Energy-Regenerative Suspension System

Technical Paper Publication. IMECE2018-86143

Thomas Lato, *University of Ontario Institute of Technology, Oshawa, ON, Canada*, **Huiyong Zhao**, *Hubei University of Automotive Technology, Shiyan, Hubei Province, China*, **Lin Zhao, Yuping He**, *University of Ontario Institute of Technology, Oshawa, ON, Canada*

11:24am – Energy Absorption Mechanisms and Crash Analysis of Helicopter Seats

Technical Paper Publication. IMECE2018-86220

Gulce Ozturk, *Turkish Aerospace Industries, Ankara, Ankara, Turkey*, **Altan Kayran**, *METU Center for Wind Energy, Ankara, Turkey*

6-7 DYNAMICS AND CONTROL IN MICRO/NANO ENGINEERING

6-7-1 Dynamics and Control in Micro/Nano Engineering I

Third Floor, David L. Lawrence Convention Center, Room 309
10:00am–11:45am

Session Chair: Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chairs: Marco Amabili, *McGill University, Montreal, QC, Canada*, Saad Ilyas, *King Abdullah University of Science & Tech, Thuwal, Saudi Arabia*

10:00am – Bouncing Dynamics of Cantilever-Type NEM Switches Considering Tip-Substrate Contact

Technical Paper Publication. IMECE2018-87124

Mohamed Bognash, Samuel Asokanthan, *University of Western Ontario, London, ON, Canada*

10:21am – Evaluation of Tribological Properties of Graphene Oxide Dispersed Liquid Paraffin Oil

Technical Paper Publication. IMECE2018-87346

Bhavyanidhi Vats, Monika Singh, *Moradabad Institute of Technology, Moradabad, India*, **Anuj Gupta**, *Gautam Buddha University, Delhi, Delhi, India*

10:42am – Frequency Response for MEMS Circular Plate Resonators Under Superharmonic Resonance of the Second Order

Technical Paper Publication. IMECE2018-87823

Martin Botello, Julio Beatriz, Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

11:03am – Investigating Simultaneous Excitation of Primary and Subharmonic Resonance on a Doubly Clamped Membrane Microbeam

Technical Presentation. IMECE2018-88976

Saad Ilyas, Feras Alfosail, Mohammad Younis, *King Abdullah University of Science & Tech, Thuwal, Saudi Arabia*

11:24am – Analytical Study of Vibratory Transport Under Spatially Asymmetric Motion

Technical Presentation. IMECE2018-88707

Jyayasi Nath, Anirvan Dasgupta, *Indian Institute of Technology Kharagpur, Kharagpur, India*

6-10 MULTIBODY DYNAMIC SYSTEMS AND APPLICATIONS

6-10-1 Multibody Dynamic Systems and Applications I

Third Floor, David L. Lawrence Convention Center, Room 306
10:00am–11:45am

Session Chair: Shanzhong (Shawn) Duan, *Saint Martin's University, Lacey, WA, United States*

10:00am – A New Approach for Locating the Instantaneous Centers of Zero Velocity for 1-DOF Planar Linkages

Technical Paper Publication. IMECE2018-86341
Nadim Diab, *Rafik Hariri University, Mount Lebanon, Lebanon*

10:21am – Identification of Vehicle Inertia Parameters: From Test Bench Design to Movement Trajectory Optimization

Technical Paper Publication. IMECE2018-87545
Di Yao, Kay Büttner, Günther Prokop, *Dresden University of Technology, Dresden, Germany*

10:42am – Vibration Suppression in Two-Dimensional Oscillation Dynamical Systems

Technical Paper Publication. IMECE2018-87858
Adnan S. Saeed, Mohammad Al-Shudeifat, *Khalifa University, Abu Dhabi, Abu Dhabi, United Arab Emir.*

11:03am – Multibody Dynamics Approaches for Study on Good and Bad Whole-Body Vibrations

Technical Paper Publication. IMECE2018-88485
Shanzhong (Shawn) Duan, *Saint Martin's University, Lacey, WA, United States*

11:24am – Real-Time Simulation of Flexible Multibody Models in Real-Time

Technical Presentation. IMECE2018-89504
William Prescott, *Siemens Product Lifecycle Management, Coralville, IA, United States*

6-3 NONLINEAR DYNAMICS, CONTROL, AND STOCHASTIC MECHANICS

6-3-1 Nonlinear Dynamics, Control, and Stochastic Mechanics I

Third Floor, David L. Lawrence Convention Center, Room 309
1:45pm–3:30pm

Session Chair: Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-ChairS: Marco Amabili, *McGill University, Montreal, QC, Canada*, Bogdan Epureanu, *University of Michigan, Ann Arbor, MI, United States*

1:45pm – Design and Development of an Unmanned Underwater Vehicle (UUV) in the Form of a Cuttlefish

Technical Paper Publication. IMECE2018-86530
Susheelkumar Cherangara Subramanian, Thao Le, Jason Olson, Sandesh G. Bhat, Sangram Redkar, *Arizona State University, Mesa, AZ, United States*

2:06pm – Modal Damping and Frequency Variations in Nonlinearly Coupled Oscillators With Negative Linear Stiffness Components

Technical Paper Publication. IMECE2018-87474
Fatima Alhamadi, Mohammad Al-Shudeifat, *Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.*

2:27pm – Nonlinear Damping in Nonlinear Vibrations

Technical Presentation. IMECE2018-87718
Marco Amabili, *McGill University, Montreal, QC, Canada*

2:48pm – Voltage Response of Circular Plate MEMS Resonators Under Superharmonic Resonance

Technical Paper Publication. IMECE2018-87766
Martin Botello, Julio Beatriz, Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

3:09pm – Dynamic Model and Control Design for a Nonlinear Hydraulic Actuator

Technical Paper Publication. IMECE2018-88320
Carlos Borrás Pinilla, José L. Sarmiento, Juan F. Ortiz, *Universidad Industrial de Santander, Bucaramanga, Colombia*

6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

6-4-5 Mechanism Design I

Third Floor, David L. Lawrence Convention Center, Room 307
1:45pm–3:30pm

Session Chair: Yin-ping Chang, *Oakland University, Rochester, MI, United States*

Session Co-Chair: Sebastian Roa Prada, *Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia*

1:45pm – Improving Motion Stability of the Plane 3-RPR Parallel Manipulator at Singular Configuration

Technical Paper Publication. IMECE2018-86218
Yu-Tong Li, Yuxin Wang, *China University of Petroleum, Huadong, Qingdao, Shandong, China*

2:06pm – Computational Design of a Bird-Inspired Perching Landing Gear Mechanism

Technical Paper Publication. IMECE2018-86615
Paul Nadan, Christopher Lee, *Franklin W. Olin College of Engineering, Needham, MA, United States*

2:27pm – Motion Capture of the Selective Hand Picking Movements as the Basis for the Design of Mechanically Assisted Picking Tools in Coffee Plantations in Colombia

Technical Paper Publication. IMECE2018-88428
Jeyson Andres Hernandez Barbosa, Sebastian Roa Prada, Dario J. Hernandez Bolivar, Brajan Nicolas Ruiz Romero, Oscar E. Rueda, *Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia*

2:48pm – Design and Construct a Portable, Low Cost, Ankle Foot Rehabilitation Device

Technical Presentation. IMECE2018-89433

Ahmad Alshorman, *Jordan University of Science and Technology, Irbid, Jordan***3:09pm – The Virtual Cam: Hexagon Method Authentication on Locating Key Instant Centers of All Planar Single Degree of Freedom Kinematically Indeterminate Linkages up to Ten-Bar**

Technical Paper Publication. IMECE2018-87802

Zhengqi Liu, *FCA, Rochester, MI, United States*, Yin-ping Chang, *Oakland University, Rochester, MI, United States***6-5 FLUID-STRUCTURE INTERACTION****6-5-2 Fluid-Structure Interaction II**Third Floor, David L. Lawrence Convention Center, Room 310
1:45pm–3:30pmSession Chair: Marco Amabili, *McGill University, Montreal, QC, Canada***1:45pm – Aerodynamics Analysis for Optimization the Design of a Baja SAE Chassis**

Technical Paper Publication. IMECE2018-88027

Jessica Gissella Maradey Lazaro, Sergio Andrés Ardila Gómez, Helio Sneyder Esteban Villegas, *Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia***2:06pm – Active Control of a Two-Dimensional Nonlinear Wing Encountering a Gust**

Technical Paper Publication. IMECE2018-88456

Xiaoyang Zhang, Mojtaba Kheiri, Wen-Fang Xie, *Concordia University, Montreal, QC, Canada***2:27pm – Investigation of Temperature Effect on Cracked Pressurized Pipes**

Technical Paper Publication. IMECE2018-88572

Karim Egab, *University of Mazaya, Nassiriyah, Nassiriyah, Iraq*, Saad Oudah, Yeasin Bhuiyan, *University of South Carolina, Columbia, SC, United States*, Ameen Nassar, *University of Basrah, Basrah, Iraq*, H.R. Hassan, *Mazaya University, Thiqr, Iraq***2:48pm – 2 DOF Vortex-Induced Vibration Response and Energy Harvesting of Slender Marine Structures**

Technical Presentation. IMECE2018-89060

Jing Xu, Menglan Duan, Yingying Wang, *China University of Petroleum (Beijing), Beijing, China***3:09pm – Research Efforts on Aeroelasticity Effects in Airborne Diesel Engine Turbochargers**

Technical Presentation. IMECE2018-89589

Ryan C. McGowan, Muthuvel Murugan, Michael T. Szedlmayer, Kenneth S. Kim, Kurt M. Kruger, David J. Gondol, Chol-Bum M. Kweon, *U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States*, Peter J. Clerkin, *Environmental Research Group, Aberdeen Proving Ground, MD, United States*, Rik D. Meininger, *Science Applications International Corporation, Redstone Arsenal, AL, United States*, Joseph A. Gibson, Khanh Q. Dang, Christopher A. Lindsey, Bernard N. Acker, *U.S. Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL, United States*, Marshall R. Musser, *Sigmatech, Inc., Huntsville, AL, United States***6-6 VIBRATION, NOISE CONTROL AND DAMPING TECHNOLOGIES****6-6-2 Vibration, Noise Control and Damping Technologies II**Third Floor, David L. Lawrence Convention Center, Room 308
1:45pm–3:30pmSession Chair: Akintoye O. Oyelade, *University of Lagos, Lagos, Nigeria***1:45pm – Energy Harvesting From a Vehicle Damper by Using Electromagnetic Transducers**

Technical Paper Publication. IMECE2018-86774

Longhan Xie, Jiehong Li, *South China University of Technology, Guangzhou, China***2:06pm – Rigid-Flexible Coupling Dynamic Modeling and Simulation of Ravigneaux Compound Planetary Gear Systems**

Technical Paper Publication. IMECE2018-86787

Yigong Lv, Yanfang Liu, Junbin Lai, Peng Dong, *Beihang University, Beijing, China***2:27pm – Frequency Domain Non-Linear Modeling and Analysis of Liquid Filled Column Dampers**

Technical Paper Publication. IMECE2018-86850

H. Sefa Kizilay, Ender Cigeroglu, *Middle East Technical University, Ankara, Turkey***2:48pm – Vibration Prediction of Horizontal Axis Washing Machine Through FEA on Wooden and Concrete Floor**

Technical Paper Publication. IMECE2018-87001

Sachin Nilawar, Vasudeo Patil, Sushilkumar Vishwakarma, *Whirlpool of India Ltd., Pune, Maharashtra, India***3:09pm – Numerical and Analytical Analyses of Bi-Stable Element as Negative Stiffness**

Technical Paper Publication. IMECE2018-87175

Akintoye O. Oyelade, *University of Lagos, Lagos, Nigeria*

6-10 MULTIBODY DYNAMIC SYSTEMS AND APPLICATIONS

6-10-2 Multibody Dynamic Systems and Applications II

Third Floor, David L. Lawrence Convention Center, Room 306
1:45pm–3:30pm

Session Chair: Shanzhong (shawn) Duan, *Saint Martin's University, Lacey, WA, United States*

1:45pm – Modeling Stabilization of Crane and Ship by Gyroscopic Control Using the Moving Frame Method
Technical Paper Publication. IMECE2018-86165

Josef Flatlandsmo, Torbjoern Smith, Ørjan Ommedal Halvorsen, *Western Norway University of Applied Sciences, Bergen, Norway*, Johnny Vinje, *Western Norway University of Applied Sciences, Flora, Sogn og Fjordane, Norway*, Thomas Impelluso, *Western Norway University of Applied Sciences, Bergen, Norway*

2:06pm – Modeling Crane Induced Ship Motion Using the Moving Frame Method

Technical Paper Publication. IMECE2018-86190
Øystein Haveland, Paulo Alexander Jacobsen Jardim, Jan Tore Rein, Thomas Impelluso, *Western Norway University of Applied Sciences, Bergen, Norway*

2:27pm – Dynamic Comparison of a 3-Degrees-of-Freedom Parallel Manipulator With Multiple Dry Clearance Joints and With Lubricated Joints

Technical Paper Publication. IMECE2018-87016
Haodong Zhang, Xianmin Zhang, Xuchong Zhang, Zhenhui Zhan, *South China University of Technology, Guangzhou, China*

2:48pm – A Variational Derivation of Equations of Motion With Contact Constraints Using SE(3)

Technical Paper Publication. IMECE2018-87126
Hidenori Murakami, *University of California, San Diego, San Diego, CA, United States*, Takeyuki Ono, *The National Defense Academy, Yokosuka, Japan*

3:09pm – Development of Equations of Motion for a Stewart Platform Under Prescribed Mount Motion

Technical Paper Publication. IMECE2018-87253
Takeyuki Ono, Ryosuke Eto, Junya Yamakawa, *The National Defense Academy, Yokosuka, Japan*, Hidenori Murakami, *University of California, San Diego, San Diego, CA, United States*

6-3 NONLINEAR DYNAMICS, CONTROL, AND STOCHASTIC MECHANICS

6-3-2 Nonlinear Dynamics, Control, and Stochastic Mechanics II

Third Floor, David L. Lawrence Convention Center, Room 309
3:45pm–5:30pm

Session Chair: Marco Amabili, *McGill University, Montreal, QC, Canada*

Session Co-Chairs: Bogdan Epureanu, *University of Michigan, Ann Arbor, MI, United States*, Isaac Elishakoff, *Florida Atlantic University, Boca Raton, FL, United States*

3:45pm – A Time-Frequency Domain Adaptive Control Approach for Vibration of Active Magnetic Bearing System
Technical Paper Publication. IMECE2018-86110

Xuan Yao, Zhaobo Chen, *Harbin Institute of Technology, Harbin, Heilongjiang, China*, Xiaoxiang Liu, *Beijing Institute of Control Engineering, Beijing, China*, Yinghou Jiao, *Harbin Institute of Technology, Harbin, Heilongjiang, China*

4:06pm – Optimal Vibration Control and Energy Scavenging Using Collocated Nonlinear Energy Sinks and Piezoelectric Elements

Technical Paper Publication. IMECE2018-86299
Zahra Nili Ahmadabadi, *Dana Incorporated, Maumee, OH, United States*, Siamak Esmaeilzadeh Khadem, *Tarbiat Modares University, Tehran, Tehran, Iran*

4:27pm – Control Analysis of a 3D Self-Balancing Inverted Pendulum and Cart System for Stability in the Event of a Sensor Failure

Technical Paper Publication. IMECE2018-87586
Sarah Lamb, *Stanley Black & Decker, Inc., New Britain, CT, United States*, Patricia Mellodge, Kiwon Sohn, Akin Tatoglu, *University of Hartford, West Hartford, CT, United States*

4:48pm – Multidimensional Integration Methods Used for Catastrophic Event Prediction Associated With Nonlinear Dynamic Responses of Road Vehicles

Technical Paper Publication. IMECE2018-88009
Jesus Gonzalez Anaya, Julian Dunne, *University of Sussex, Brighton, United Kingdom*

5:09pm – Rigorous Implementation of the Galerkin Method for Stepped Columns

Technical Presentation. IMECE2018-87779
Isaac Elishakoff, *Florida Atlantic University, Boca Raton, FL, United States*, Damien Boutur, *Sigma Clermont, Aubiere, France*

6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

6-4-6 Mechanism Design II

Third Floor, David L. Lawrence Convention Center, Room 307
3:45pm–5:30pm

Session Chair: Hong Zhou, *Texas A&M University-Kingsville, Kingsville, TX, United States*

Session Co-Chair: Naoufel Azouz, *University of Evry, Evry-Courcouronnes, France*

3:45pm – Modeling Subsea ROV Motion Using the Moving Frame Method

Technical Paper Publication. IMECE2018-86191

Katrine Oen Austefjord, Linn-Kristin Skeide Larsen, *Western Norway University of Applied Sciences, Bergen, Hordaland, Norway*, **Martin Hestvik, Høgskolen på Vestlandet, Kristiansund, MORE OG ROMSDAL,** *Norway*, **Thomas Impelluso,** *Western Norway University of Applied Sciences, Bergen, Norway*

4:06pm – Modelling and Design of an Airship Crane

Technical Paper Publication. IMECE2018-87587

Naoufel Azouz, *University of Evry, Evry-Courcouronnes, France*, **Mahmoud Khamlia, Fida Benabdallah,** *University of Evry Paris-Saclay, Evry-Courcouronnes, France*, **Fatma Guesmi,** *Polytechnic School of Tunis, La Marsa, Tunisia*

4:27pm – Path Generation Algorithm Verification of Five DOF Robotic Arm With Linear Actuator Using MATLAB Sim-Mechanics

Technical Paper Publication. IMECE2018-88185

Ahmed Y. AbdelHamid, *Military Technical College, Cairo, Egypt*, **Maged M. Abou Elyazed,** *Technical Research Center, Cairo, Egypt*, **Abdelrahman Zaghloul,** *McMaster University, Hamilton, ON, Canada*

4:48pm – Locomotion of Two-Mass Robot Using an Impulsive actuator

Technical Presentation. IMECE2018-89432

Ahmad Alshorman, *Jordan University of Science and Technology, Irbid, Jordan*

5:09pm – Linkage Synthesis for Solar Tracking

Technical Paper Publication. IMECE2018-86471

Kavan Jani, Hong Zhou, Chung Leung, *Texas A&M University-Kingsville, Kingsville, TX, United States*

6-6 VIBRATION, NOISE CONTROL AND DAMPING TECHNOLOGIES

6-6-3 Vibration, Noise Control and Damping Technologies III

Third Floor, David L. Lawrence Convention Center, Room 308
3:45pm–5:30pm

Session Chair: Ashok Belegundu, *Pennsylvania State University, University Park, PA, United States*

3:45pm – Optimized Vibration Suppression of Structural Floor Using Passive TMD

Technical Paper Publication. IMECE2018-87488

Zaman Chini, Haifeng Zhang, *University of North Texas, Denton, TX, United States*

4:00pm – Vibration Analysis of Washing Machines in Rotating Plane of Drum

Technical Paper Publication. IMECE2018-88632

Cem Baykal, Ender Cigeroglu, Yigit Yazicioglu, *Middle East Technical University, Ankara, Turkey*

4:15pm – Optimal Design of a Segmented Tube With Side Branches for Noise Reduction

Technical Paper Publication. IMECE2018-88691

Ashok Belegundu, *Pennsylvania State University, University Park, PA, United States*, **Michael Grissom,** *Soundless, LLC, State College, PA, United States*

4:30pm – Quenching of Friction Induced Vibration by Tangential Acceleration Feedback Control

Technical Presentation. IMECE2018-88894

Jyayasi Nath, *IIT Kharagpur, Kharagpur, India*, **Shyamal Chatterjee,** *IEST SHIBPUR, Howrah, India*

4:45pm – Theoretical Model for Vibration Reduction in Human Body-Wheelchair System

Technical Presentation. IMECE2018-89523

Akihiro Yamamoto, Shinichiro Ota, *Okayama Prefectural University, Souja, Okayama, Japan*

5:00pm – Dynamic Analysis Rectangular Aluminium Plate Under Transverse Loading Using Finite Difference Algorithm

Technical Paper Publication. IMECE2018-86198

Michael Agarana, *Covenant University, Ota, Ogun State, Nigeria*, **Esther Akinlabi,** *University of Johannesburg, Johannesburg, Gauteng Province, South Africa*

6-10 MULTIBODY DYNAMIC SYSTEMS AND APPLICATIONS

6-10-3 Multibody Dynamic Systems and Applications III

Third Floor, David L. Lawrence Convention Center, Room 306
3:45pm–5:30pm

Session Chair: Shanzhong (Shawn) Duan, *Saint Martin's University, Lacey, WA, United States*

Session Co-Chair: Isaac Elishakoff, *Florida Atlantic University, Boca Raton, FL, United States*

3:45pm – Steering Strategy for a Multi-Axle Wheeled Vehicles

Technical Paper Publication. IMECE2018-86323
Waqar Ahmed, Sana Fatima, Raja Amer Azim, *National University of Sciences and Technology, Islamabad, Pakistan*

4:06pm – Finite Element Analysis of Contact Force Models During Solid Elastic and Plastic Bodies Impact

Technical Paper Publication. IMECE2018-87458
Gustavo Rodrigues, *Universidade Estácio de Sá, Rio de Janeiro, Brazil*, **Hans Weber,** *Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil*, **Larissa Driemeier,** *University of São Paulo, São Paulo, Brazil*

4:27pm – Topology Optimization of an Anti Roll Bar of a Heavy Commercial Truck for Vehicle Dynamics and Durability

Technical Paper Publication. IMECE2018-87862
Ece Yenilmez, Ali Yasar, Polat Sendur, *Ozyegin University, Cekmekoy, Istanbul, Turkey*

4:48pm – Design Optimization and Dynamic Analysis of Elliptical Cross-Section Helical Spring

Technical Presentation. IMECE2018-89537
Majdi Gzal, Oleg Gendelman, *Technion, Israel Institute of Technology, Haifa, Israel*

5:09pm – Uncertainty Quantification of Edwards High-Pressure Pipe Behavior Using Complex System Thermal-Hydraulics Codes

Technical Paper Publication. IMECE2018-88053
Mojtaba Raheli Kaleibar, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Mohammad Pourogl-Mohammad,** *JCI/Sahand University of Technology, York, PA, United States*, **Rahim Khoshbakhti Saray,** *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Seyed Mohsen Hoseyni,** *KTH Royal Institute of Technology, Stockholm, Sweden*

6-11 VIBRATIONS OF CONTINUOUS SYSTEMS

6-11-1 Vibrations of Continuous Systems I

Third Floor, David L. Lawrence Convention Center, Room 310
3:45pm–5:30pm

Session Chair: Dumitru Caruntu, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chairs: Marco Amabili, *McGill University, Montreal, QC, Canada*, Berkan Alanbay, *Virginia Tech, Blacksburg, VA, United States*

3:45pm – Vibration of Curvilinearly Stiffened Plates Using Ritz Method With Orthogonal Jacobi Polynomials

Technical Paper Publication. IMECE2018-86871
Berkan Alanbay, Karanpreet Singh, Rakesh Kapania, *Virginia Tech, Blacksburg, VA, United States*

4:06pm – Dynamic Analysis and Parametric Excitation of a Multi-Span Beam Structure Coupled With a Sequence of Moving Rigid Bodies

Technical Paper Publication. IMECE2018-87181
Hao Gao, Bingen (Ben) Yang, *University of Southern California, Los Angeles, CA, United States*

4:27pm – Parametric Instability of Planetary Gear Transmission Mounted on Discrete Support Struts With Minimum Ring Gear Rim Thickness Design

Technical Paper Publication. IMECE2018-87220
Peng Guan, *University of Tennessee, Dublin, OH, United States*, **Hans Desmidt,** *University of Tennessee, Knoxville, TN, United States*

4:48pm – Parametric Resonance of Electrostatically Actuated MEMS Cantilever Resonators: Homotopy Analysis Method Versus the Method of Multiple Scales

Technical Paper Publication. IMECE2018-88015
Dumitru Caruntu, Christopher Reyes, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

5:09pm – A Simple Spring-Loaded Inverted Pendulum (Slip) Model of a Bio-Inspired Quadrupedal Robot Over Compliant Terrains

Technical Paper Publication. IMECE2018-87134
Hasti Hayati, Paul Walker, Terry Brown, Paul Kennedy, David Eager, *University of Technology Sydney, Sydney, NSW, Australia*

6-20 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM: DYNAMICS, VIBRATION, AND CONTROL FOR STRUCTURAL HEALTH MONITORING APPLICATIONS

6-20-1 Dynamics, Vibration, and Control for Structural Health Monitoring Applications I

Third Floor, David L. Lawrence Convention Center, Room 305
3:45pm–5:30pm

Session Chair: Andrei Zagrai, *New Mexico Institute of Mining
& Technology, Socorro, NM, United States*

3:45pm – Interfacial Strength Evaluation of Surface Coatings by Using Repeated Pulsed Laser Irradiations

Technical Presentation. IMECE2018-86494

Takeshi Yamada, Yusaku Saito, Kohei Kanamori,
Akio Yonezu, *Chuo University, Tokyo, Japan*

4:06pm – A Phase Spectrum Method for the Measurement of Liquid-Layer Thickness

Technical Paper Publication. IMECE2018-87201

Wenbin Huang, Quanchang Li, Junkai Ding, *Chongqing
University, Chongqing, China*

4:27pm – Negative Effective Stiffness Content in Cracked Rotors

Technical Paper Publication. IMECE2018-87470

Mohammad Al-Shudeifat, Fatima Alhammadi, Khalifa
*University of Science and Technology, Abu Dhabi, Abu Dhabi,
United Arab Emir.*

4:48pm – Electromechanical-Resonance-Based Self- Sensing in Metal-Cement Structures

Technical Presentation. IMECE2018-88325

Zhong Liang, Deborah D.L. Chung, *University at Buffalo,
State University of New York, Buffalo, NY, United States*

5:09pm – Application of Electromechanical Impedance Method to Structural Health Monitoring of Composite Elements of Aerospace Structures

Technical Presentation. IMECE2018-89507

Aaron Misla, Andrei Zagrai, *New Mexico Institute of Mining &
Technology, Socorro, NM, United States*

TRACK 7 ENGINEERING EDUCATION

- 7-1-1: Curriculum Innovations, Pedagogy and Learning Methodologies – I**
- 7-1-2: Curriculum Innovations, Pedagogy and Learning Methodologies – II**
- 7-2-1: Globalization of Engineering**
- 7-3-1: Engineering Accreditation, Data Collection, Assessment and ABET Session I**
- 7-3-2: Engineering Accreditation, Data Collection, Assessment and ABET Session II**
- 7-4-1: Systems Engineering and Sustainable Engineering Education – I**
- 7-4-2: Systems Engineering and Sustainable Engineering Education – II**
- 7-5-1: Applied Mechanics, Dynamic Systems and Control Engineering – I**
- 7-5-2: Applied Mechanics, Dynamic Systems and Control Engineering – II**
- 7-6-1: Fluid Mechanics, Heat Transfer, Experiments and Energy Systems**
- 7-7-1: Problem Solving in Engineering Education, Research and Practice – I**
- 7-7-2: Problem Solving in Engineering Education, Research and Practice – II**
- 7-8-1: Distance/Online Engineering, Models and Enabling Technologies – I**
- 7-8-2: Distance/Online Engineering, Models and Enabling Technologies – II**
- 7-9-1: K-12 STEM, RET- University, School and Industry Alliance, Session in Honor of Late Professor Devdas Pai**
- 7-10-1: Teaching Laboratories, Machine Shop Experiences and Technology-Aided Learning**
- 7-12-1: Engineering Research Innovation**

ACKNOWLEDGMENT

Track Organizers

Subha Kumpaty, *Milwaukee School of Engineering, United States*
Mohammad Naraghi, *Manhattan College, United States*

Topic Organizers

Anabela Alves, *University of Minho, Portugal*
Amir Karimi, *University of Texas-San Antonio, United States*
Hephzibah Kumpaty, *University of Wisconsin–Whitewater, United States*
Nael Barakat, *Texas A&M Kingsville, United States*
Mohammad Mahinfalah, *Milwaukee School of Engineering, United States*

Wael Mokhtar, *Grand Valley State University, United States*
Zbigniew Bzymek, *University of Connecticut, United States*
Reza Mirshams, *University of North Texas, United States*
Emine Celik Foust, *York College of Pennsylvania, United States*
Salim Azzouz, *Midwestern State University, United States*

Session Organizers

Anabela Alves, *University of Minho, Portugal*
Salim Azzouz, *Midwestern State University, United States*
Celina P. Leao, *University of Minho, Portugal*

Subha Kumpaty, *Milwaukee School of Engineering, United States*
Amir Karimi, *University of Texas–San Antonio, United States*
Nael Barakat, *Texas A&M Kingsville, United States*
Emine Celik Foust, *York College of Pennsylvania, United States*
Mohammad Mahinfalah, *Milwaukee School of Engineering, United States*
Wael Mokhtar, *Grand Valley State University, United States*
Mohammad Naraghi, *Manhattan College, United States*
Nazmul Islam, *University of Texas Rio Grande Valley, United States*

TRACK 7 ENGINEERING EDUCATION

WEDNESDAY, NOVEMBER 14

7-13 ENGINEERING EDUCATION PLENARY**7-13-1 Engineering Education Plenary**Third Floor, David L. Lawrence Convention Center, Room 302
9:00am–9:45am**9:00am – Lessons and Perspectives on Transformational Engineering Education: Past, Present, and Future**

Plenary Presentation. IMECE2018-90098

Harvey Borovetz, *University of Pittsburgh, Pittsburgh, PA, United States***7-2 GLOBALIZATION OF ENGINEERING****7-2-1 Globalization of Engineering**Third Floor, David L. Lawrence Convention Center, Room 317
10:00am–11:45amSession Chair: Subha Kumpaty, *Milwaukee School of Engineering, Milwaukee, WI, United States***10:00am – Temperature and Heat Flux Data-Logger for Use in Tunnel Ovens: An International Partnered Project**

Technical Paper Publication. IMECE2018-86076

Alexander Watt, Jason Wichert, Justine Staniszewski, Nathaniel Nakles, Yvonne English, Mike Bright, *Grove City College, Grove City, PA, United States*, Michel Havet, *ONIRIS, Nantes, France*, Erik Bardy, Mark Reuber, *Grove City College, Grove City, PA, United States***10:21am – Study on Functionally Gradient Materials Under International Research Experiences for Undergraduates Program: US–South Africa Collaboration**

Technical Paper Publication. IMECE2018-86288

Subha Kumpaty, *Milwaukee School of Engineering, Milwaukee, WI, United States*, Esther Akinlabi, *University of Johannesburg, Johannesburg, South Africa*, Sisa Pityana, *Council of Scientific and Industrial Research, Pretoria, South Africa*, Andrew Gray, Kevin Sivak, *Milwaukee School of Engineering, Milwaukee, WI, United States*, Mutiu F. Erinosh, *University of Johannesburg, Johannesburg, South Africa***10:42am – Curricular Structure for a Mechanical Engineering Undergrad Program Based on Human Capabilities and Professional Competences**

Technical Paper Publication. IMECE2018-88240

Diego A. Flórez, *Universidad Pontificia Bolivariana, Medellin, Colombia***11:03am – Motivational Tools for Engineering Students in Privileged Developing Countries: Examples From UAE**

Technical Paper Publication. IMECE2018-88499

Bashar El-Khasawneh, *Khalifa University, Abu Dhabi, United Arab Emir.***11:24am – Gender Climate and Gender Experience in Engineering Education**

Technical Presentation. IMECE2018-86385

Jan Fertig, Subha Kumpaty, *Milwaukee School of Engineering, Milwaukee, WI, United States***7-4 SYSTEMS ENGINEERING AND SUSTAINABLE ENGINEERING EDUCATION****7-4-1 Systems Engineering and Sustainable Engineering Education – I**Third Floor, David L. Lawrence Convention Center, Room 318
10:00am–11:45amSession Chair: Nael Barakat, *Texas A&M Kingsville, Kingsville, TX, United States***10:00am – Application of Systems Engineering to Machine Design for Technology Students**

Technical Paper Publication. IMECE2018-86713

Anthony D. Angelo, *U.S. Army ARDEC, Hillsborough, NJ, United States*, Edwin K.P. Chong, *Colorado State University, Ft. Collins, CO, United States***10:21am – Technology on Trial: The Social Framework of Safe Design**

Technical Paper Publication. IMECE2018-87017

W.P. Munsell, *University of Oklahoma, Norman, OK, United States***10:42am – Assessing the Educational Effectiveness of a System Engineering Software in Capstone Design Projects**

Technical Paper Publication. IMECE2018-87640

Angran Xiao, *New York City College of Technology, Yorktown Heights, NY, United States*, Gaffar Gailani, Shaojin Zhang, *New York City College of Technology, Brooklyn, NY, United States***11:03am – Development of a New Course on Microgrids and Distributed Energy Resources**

Technical Paper Publication. IMECE2018-88506

Sasan Haghani, *University of the District of Columbia, Washington, DC, United States*

7-5 APPLIED MECHANICS, DYNAMIC SYSTEMS AND CONTROL ENGINEERING

7-5-1 Applied Mechanics, Dynamic Systems and Control Engineering – I

Third Floor, David L. Lawrence Convention Center, Room 316
10:00am–11:45am

Session Chair: Mohammad Mahinfalah, *Milwaukee School of Engineering, Milwaukee, WI, United States*

10:00am – Inspiring Learning: Assessment of Friction in a Real-World Model Using the Moving Frame Method in Dynamics

Technical Paper Publication. IMECE2018-86189

Thorstein R. Rykkje, *University of Bergen, Bergen, Hordaland, Norway*, **Erlend Bergaas**, *Western Norway University of Applied Sciences, Bergen, Norway*, **Andreas Skjelde**, *Høgskolen på Vestlandet, Bergen, Hordaland, Norway*, **Daniel Leinebø**, **Thomas Impelluso**, *Western Norway University of Applied Sciences, Bergen, Norway*

10:21am – Interactive Educational Testbed for Statics and Mechanics of Materials

Technical Paper Publication. IMECE2018-87938

Zhelong He, **Qingchang Liu**, **Katherine Yang**, **Niemann Pest**, **Baoxing Xu**, **Jason Kerrigan**, **Marek-Jerzy Pindera**, *University of Virginia, Charlottesville, VA, United States*

10:42am – Developing and Implementing a Projectile Launching Mechanism During a Senior Engineering Capstone Project to Demonstrate Advanced Projectile Motion Principles

Technical Presentation. IMECE2018-87173

Edward Bednarz III, **Debbie A. French**, *Wilkes University, Wilkes-Barre, PA, United States*

11:03am – Derivation of Rotation Matrix for Axis-Angle Representation of Rotation Based on an Intuitive Interpretation of Rotation Matrix to Be Taught in Robot Kinematics Courses

Technical Presentation. IMECE2018-89645

Roshan Kumar Hota, **Kumar Cheruvu**, *Indian Institute of Technology Kharagpur, Kharagpur, India*

7-1 CURRICULUM INNOVATIONS, PEDAGOGY, AND LEARNING METHODOLOGIES

7-1-1 Curriculum Innovations, Pedagogy, and Learning Methodologies – I

Third Floor, David L. Lawrence Convention Center, Room 317
1:45pm–3:30pm

Session Chair: Anabela Alves, *University of Minho, Guimareves, Portugal*

Session Co-Chair: Salim Azzouz, *Midwestern State University, Wichita Falls, TX, United States*

1:45pm – Traditional, Active, and Problem-Based Learning Methods Used to Improve an Undergraduate Biomechanics Course

Technical Paper Publication. IMECE2018-87478

Sally Shady, *Stevens Institute of Technology, Hoboken, NJ, United States*

2:06pm – User Centered Design Applied to the Improvement of Fine Motor Skills

Technical Paper Publication. IMECE2018-88407

Carolina Castro Alarcon, **Santiago Eduardo Castillo Cadena**, **Daniel Haro Mendoza**, *National Autonomous University of Mexico, Mexico City, Mexico*, **Alejandro Ramirez-Reivich**, *National Autonomous University of Mexico, Distrito Federal, Mexico*, **Vicente Borja Ramirez**, *National Autonomous University of Mexico, Distrito Federal, Mexico*, **Arturo Treviño Arizmendi**, *National Autonomous University of Mexico, Periodista, Mexico*, **Jessica Daniela Vega Bello**, *National Autonomous University of Mexico, Venustiano Carranza, Mexico*, **Yesica Escalera Matamoros**, *National Autonomous University of Mexico, Coyoacan, Mexico*

2:27pm – Integrating Collaborative Robots in Engineering and Engineering Technology Programs

Technical Paper Publication. IMECE2018-88147

Ana Djuric, **Jeremy Rickli**, *Wayne State University, Detroit, MI, United States*, **John P. Sefcovic**, **Donald Hutchison**, **Michael M. Goldin**, *Oakland Community College, Auburn Hills, MI, United States*

2:48pm – Understanding Mathematical Definitions of Circularity/Roundness in ASME GD&T Y14.5 As Related to Part Functionality

Technical Paper Publication. IMECE2018-87148

Chittaranjan Sahay, *University of Hartford, Glastonbury, CT, United States*, **Suhash Ghosh**, *University of Hartford, West Hartford, CT, United States*

7-4 SYSTEMS ENGINEERING AND SUSTAINABLE ENGINEERING EDUCATION

7-4-2 Systems Engineering and Sustainable Engineering Education- II

Third Floor, David L. Lawrence Convention Center, Room 318
1:45pm–3:30pm

Session Chair: Emine Celik Foust, *York College of Pennsylvania, York, PA, United States*

1:45pm – Devices to Aid Mobility: Biomedical Engineering-Focused Undergraduate Senior Capstone Design Projects Technical Paper Publication. IMECE2018-86826

Lara Thompson, Jiajun Xu, Devdas Shetty, *University of the District of Columbia, Washington DC, United States*

2:06pm – Measuring the Impact of a New Mechanical Engineering Sophomore Design Course on Students' Systems Thinking Skills

Technical Paper Publication. IMECE2018-87624
Cassandra Degen, Karim H. Muci-Kuchler, *South Dakota School of Mines and Technology, Rapid City, SD, United States*, Mark Bedillion, *Carnegie Mellon University, Gibsonia, PA, United States*, Shaobo Huang, *South Dakota School of Mines and Technology, Rapid City, SD, United States*, Marius D. Ellingsen, *VRC Metal Systems, Rapid City, SD, United States*

2:27pm – Student Learning Projects in Sustainable Energy: Solar-Powered Algae Culture, Photovoltaics, and CO₂ Capture

Technical Paper Publication. IMECE2018-88404
Michael Mauk, Richard Chiou, Carlos Ruiz, Jean Espaillet, Senyu Wang, Ainhoa Garcia, Robert Surette, *Drexel University, Philadelphia, PA, United States*

2:48pm – Revolutionizing Mechanical Engineering Departments

Technical Presentation. IMECE2018-89725
Yen-Lin Han, *Seattle University, Seattle, WA, United States*, Edward Berger, Elizabeth Briody, *Purdue University, West Lafayette, IN, United States*, Kathleen Cook, Greg Mason, *Seattle University, Seattle, WA, United States*, Edward Morrison, *Purdue University, West Lafayette, IN, United States*, Teodora Shuman, *Seattle University, Seattle, WA, United States*, Jennifer Turns, *University of Washington, Seattle, WA, United States*, Elizabeth Wirtz, *Purdue University, West Lafayette, IN, United States*

7-5 APPLIED MECHANICS, DYNAMIC SYSTEMS AND CONTROL ENGINEERING

7-5-2 Applied Mechanics, Dynamic Systems and Control Engineering- II

Third Floor, David L. Lawrence Convention Center, Room 316
1:45pm–3:30pm

Session Chair: Mohammad Mahinfalah, *Milwaukee School of Engineering, Milwaukee, WI, United States*

1:45pm – Rattlebacks for Undergraduate Engineers: Modelling Complex Behavior Using Introductory Dynamics and Numerical Methods

Technical Paper Publication. IMECE2018-86580
Simon Jones, Kirby Kern, *Rose-Hulman Institute of Technology, Terre Haute, IN, United States*

2:06pm – Robotic Polishing of Free-Form Surfaces With Controlled Force and Effective Path Planning

Technical Paper Publication. IMECE2018-87371
Imran Mohsin, Kai He, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China*, Ruxu Du, *Chinese University of Hong Kong, Hong Kong, Hong Kong*

2:27pm – A Consistent Approach to Problem Solving in Mechanical Vibrations

Technical Paper Publication. IMECE2018-88241
Amir Danesh Yazdi, Yi Wu, Oladipo Onipede, *Penn State University Erie, Erie, PA, United States*

2:48pm – A Material Model Fitting for Recycled Polyethylene Terephthalate Implemented in the Finite Element Modeling

Technical Paper Publication. IMECE2018-88305
Diego Fernando Mesa Vargas, *Universidad de Guanajuato, Salamanca, Mexico*, Agustin Vidal-Lesso, *Universidad de Guanajuato-Dicis, Salamanca, Mexico*, Jorge Arturo Alfaro Ayala, *Universidad de Guanajuato, Guanajuato, Guanajuato, Mexico*

7-1 CURRICULUM INNOVATIONS, PEDAGOGY AND LEARNING METHODOLOGIES

7-1-2 Curriculum Innovations, Pedagogy and Learning Methodologies – II

Third Floor, David L. Lawrence Convention Center, Room 317
3:45pm–5:30pm

Session Chair: Anabela Alves, *University of Minho, Guimareves, Portugal*

Session Co-Chair: Celina P. Leao, *University of Minho, Guimaraes, Portugal*

3:45pm – Dealing With the Students' Profile Diversity in an Industrial Engineering and Management Program: PBL versus Non-PBL

Technical Paper Publication. IMECE2018-86368
Anabela Alves, Francisco Moreira, Celina P. Leao, *University of Minho, Guimarães, Portugal*

4:06pm – Blended Learning by Gamification in a Second-Year Introductory Engineering Design Course

Technical Paper Publication. IMECE2018-86879
Alyona Sharunova, Ahmed Ead, Christopher Robson, Misha Afaq, Pierre Mertiny, *University of Alberta, Edmonton, AB, Canada*

4:27pm – Effectiveness of Evidence-Based Active Learning Pedagogies in Engineering Technology Courses

Technical Paper Publication. IMECE2018-87656
Mohsen Ayoobi, Mukasa Ssemakula, Ana Djuric, *Wayne State University, Detroit, MI, United States*

4:48pm – A Reflection of a Pedagogic Approach in an Engineering Course

Technical Paper Publication. IMECE2018-88538
Manuel Eduardo Ferreira, *University of Minho, Guimarães, Portugal,* **Joao Ferreira,** *Metrics, Guimarães, Portugal,* **Celina P. Leao,** *University of Minho, Guimarães, Portugal*

5:09pm – Development of a Hybrid Heat and Mass Transfer Course

Technical Paper Publication. IMECE2018-87934
Julie Mendez, *Indiana University-Purdue University Columbus, Columbus, IN, United States*

7-9 PRE-COLLEGE (K-12) STEM, RET— UNIVERSITY, SCHOOL AND INDUSTRY ALLIANCE (IN HONOR OF LATE PROFESSOR DEVDAS PAI)

7-9-1 K-12 STEM, RET—University, School and Industry Alliance, Session in Honor of Late Professor Devdas Pai

Third Floor, David L. Lawrence Convention Center, Room 318
3:45pm–5:30pm

Session Chair: Subha Kumpaty, *Milwaukee School of Engineering, Milwaukee, WI, United States*

3:45pm – Development of a Multidisciplinary Engineering Research Program for Middle/High School Teachers

Technical Paper Publication. IMECE2018-86411
Wen Li, Joshua Kim, Drew Kim, *Michigan State University, East Lansing, MI, United States,* **Adam Alster,** *Renaissance High School, Detroit, MI, United States,* **Marianne Livezey,** *Pontiac High School, Pontiac, MI, United States,* **Tuyen Duddles,** *Macomb Math and Science, Warren, MI, United States*

4:06pm – Collaborative Multidisciplinary Engineering Design Experiences in IoT (Internet of Things) for Teachers Through Summer Research Site Program

Technical Paper Publication. IMECE2018-87491
Hyoung Jin Cho, Alireza Karbalaee, Damla Turgut, Melissa Dagley, Eleazar Vasquez III, *University of Central Florida, Orlando, FL, United States*

4:27pm – Mechanical Engineering Student Developed Lego Engineering Design Learning Activity for 6th Grade Science Students

Technical Paper Publication. IMECE2018-87499
Heather Lai, *SUNY New Paltz, New Paltz, NY, United States,* **Laura Bryant,** *New Paltz Middle School, New Paltz, NY, United States*

4:48pm – A Project-Based Learning Stem Program for Middle and High School Students

Technical Paper Publication. IMECE2018-88647
Mohamed Gharib, G. Benjamin Cieslinski, Jowaher Al-Marri, Brady Creel, *Texas A&M University at Qatar, Doha, Qatar*

5:09pm – Experiential Learning in STEM at the University of the District of Columbia (UDC) Through the Implementation of the First UDC Firebird Rover for the NASA Human Exploration Rover Challenge

Technical Presentation. IMECE2018-88700
Jiajun Xu, Sasan Haghani, *University of the District of Columbia, Washington, DC, United States*

7-12 ENGINEERING RESEARCH INNOVATION AND RESEARCH EXPERIENCES FOR UNDERGRADUATES

7-12-1 Engineering Research Innovation

Third Floor, David L. Lawrence Convention Center, Room 316
3:45pm–5:30pm

Session Chair: Nazmul Islam, *Univ of Texas Rio Grande Valley, Edinburg, TX, United States*

3:45pm – Development and Testing of a Lab-Scale Air-Gap Membrane Distillation Unit for Water Desalination

Technical Paper Publication. IMECE2018-87088
Reza Baghaei Lakeh, Keaton Cornell, Benny Ly, Aaron Chan, *Cal Poly Pomona, Pomona, CA, United States, Sepideh Jankhah, Sterlitech Corp., Kent, WA, United States*

4:06pm – Design of Instruments for Mechanical Testing of 3D Printed Parts

Technical Presentation. IMECE2018-87115
Serdar Tumkor, Jonathan Holman, Jace M. Rearick, *University of Pittsburgh, Johnstown, PA, United States*

4:27pm – Outcomes of the Student Mentoring and Research Training (SMART) Program

Technical Paper Publication. IMECE2018-88684
Nazmul Islam, Amy Weimer, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

4:48pm – 3D Food Printing Insights and Opportunities: A Capstone Design Case Study

Technical Presentation. IMECE2018-88770
Joseph Piacenza, *University of West Florida, Pensacola, FL, United States, Hope Weiss, Monika Patel, Sean Moore, Tam Nguyen,* *California State University Fullerton, Fullerton, CA, United States*

5:09pm – The Concept of Integrated Research in Engineering Education

Technical Presentation. IMECE2018-88887
Mohammad Asaduzzaman Chowdhury, *Dhaka University of Engineering & Technology, Gazipur, Bangladesh, Bengir Ahmed Shuvho,* *Dhaka University of Engineering & Technology, Dhaka, Bangladesh, Uttam Kumar Debnath, Rajib Nandee,* *Dhaka University of Engineering & Technology, Gazipur, Bangladesh, Suman Das,* *University of Saskatchewan, Saskatchewan, SK, Canada, Atiqur Rahman,* *Bangladesh Road Transport Authority, Dhaka, Bangladesh*

THURSDAY, NOVEMBER 15

7-8 DISTANCE/ONLINE ENGINEERING EDUCATION, MODELS AND ENABLING TECHNOLOGIES

7-8-1 Distance/Online Engineering, Models and Enabling Technologies – I

Third Floor, David L. Lawrence Convention Center, Room 317
8:55am–10:40am

Session Chair: Mohammad Naraghi, *Manhattan College, Bronx, NY, United States*

8:55am – Immersive Educational Systems With Procedure-Oriented Combinations of Real and Virtual Environments

Technical Paper Publication. IMECE2018-86597
Zhou Zhang, *CUNY New York City College of Technology, Jersey City, NJ, United States, Shaojin Zhang,* *New York City College of Technology, Brooklyn, NY, United States, Mingshao Zhang,* *Southern Illinois University Edwardsville, Edwardsville, IL, United States, Sven Esche,* *Stevens Institute of Technology, Hoboken, NJ, United States*

9:16am – Virtual Teach Pendant Interface for Android Cellphones (VTPAC)

Technical Paper Publication. IMECE2018-86865
Giulia A. Ferri, *Federal University of Technology, Curitiba, Parana, Brazil, Scott Walter, Asiri Tennakoon,* *Visual Components, Lake Orion, MI, United States, Ana Djuric,* *Wayne State University, Detroit, MI, United States*

9:37am – Real-Time Distance Courses to Improve Satisfaction and Competence: A Case Study of International Professors and Local Students

Technical Paper Publication. IMECE2018-86877
Martha Elena Núñez, *Tecnologico de Monterrey, Puebla, Puebla, Mexico, Juan-Carlos Rojas,* *Tecnologico de Monterrey, Monterrey, Nuevo León, Mexico*

9:58am – Assessing the Impact of Using Educational Videos in Teaching Engineering Courses

Technical Paper Publication. IMECE2018-88216
Essam Zaneldin, Waleed Ahmed, *United Arab Emirates University, Al Ain, United Arab Emir.*

10:19am – Development of a Virtual Objects Tool to Enhance Pedagogy of Thermodynamic Concepts

Technical Presentation. IMECE2018-89415
Sathyanarayanan Subramanian, Diana Bairaktarova, Scott Huxtable, *Virginia Polytechnic Institute and State University, Blacksburg, VA, United States*

7-10 TEACHING LABORATORIES, MACHINE SHOP EXPERIENCES, AND TECHNOLOGY-AIDED LECTURING

7-10-1 Teaching Laboratories, Machine Shop Experiences and Technology-Aided Learning

Third Floor, David L. Lawrence Convention Center, Room 316
8:55am–10:40am

Session Chair: Salim Azzouz, *Midwestern State University, Wichita Falls, TX, United States*

8:55am – Incorporating Student-Led Design Projects in Instrumentation and Measurements Laboratory

Technical Paper Publication. IMECE2018-86055

Emine Celik Foust, *York College of Pennsylvania, York, PA, United States*

9:16am – Introduction of Prevention Engineering in Mechanical Engineering Curriculum

Technical Presentation. IMECE2018-86447

Zbigniew Bzymek, *University of Connecticut, Storrs, CT, United States*

9:37am – A Gear-Chain Based Transmission for the Machine Elements Design Laboratory

Technical Paper Publication. IMECE2018-87107

Salim Azzouz, Guy Bernard, *Midwestern State University, Wichita Falls, TX, United States*

9:58am – Manufacturing Science Laboratory: Robotic Ultrasonic Welding

Technical Paper Publication. IMECE2018-88437

Michael Mauk, Richard Chiou, Carlos Ruiz, Prashant Yadav, *Drexel University, Philadelphia, PA, United States*

10:19am – A Proposed Engineering Curriculum for At-Risk Students

Technical Presentation. IMECE2018-88921

Louis Everett, *University of Texas El Paso, El Paso, TX, United States*

7-3 ENGINEERING ACCREDITATION, DATA COLLECTION, ASSESSMENT AND ABET

7-3-1 Engineering Accreditation, Data Collection, Assessment and ABET Session I

Third Floor, David L. Lawrence Convention Center, Room 316
10:50am–12:35pm

Session Chair: Amir Karimi, *University of Texas-San Antonio, San Antonio, TX, United States*

10:50am – Sensitising Core Employability Skill Through Peer Assessment Approach

Technical Paper Publication. IMECE2018-86056

Siddharthsinh Jadeja, *Aditya Silver Oak Institute of Technology, Rajkot Gujarat, India*, **Sujata Wadhwa**, *FSO, Ahmedabad, India*, **Kapil Shukla**, *Silver Oak College of Engineering & Technology, Ahmedabad, India*, **Amit Ved**, *Marwadi University, Rajkot, India*

11:11am – An Excel Add-in for Accreditation Data Collection and Auto Grading Sheets (AGS): A Canadian Experience

Technical Paper Publication. IMECE2018-88096

Mohamed Ismail, *University of Regina, Regina, SK, Canada*

11:32am – Improving Engineering Students' College Math Readiness by MSEIP Summer Bridge Program

Technical Paper Publication. IMECE2018-88685

Nazmul Islam, Yong Zhou, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

11:53am – Implementation of a New Student Outcome Assessment and Continuous Improvement Procedure for ABET-ETAC at SUNY Morrisville

Technical Presentation. IMECE2018-88855

Mehmet Murat Baysal, *SUNY Morrisville State College, Morrisville, NY, United States*

7-8 DISTANCE/ONLINE ENGINEERING EDUCATION, MODELS AND ENABLING TECHNOLOGIES

7-8-2 Distance/Online Engineering, Models and Enabling Technologies- II

Third Floor, David L. Lawrence Convention Center, Room 317
10:50am–12:35pm

Session Chair: Mohammad Naraghi, *Manhattan College, Bronx, NY, United States*

10:50am – Development of Telepresence Teaching Robots With Social Capabilities

Technical Paper Publication. IMECE2018-86686

Mingshao Zhang, Pengji Duan, *Southern Illinois University Edwardsville, Edwardsville, IL, United States*, **Zhou Zhang**, *CUNY New York City College of Technology, Jersey City, NJ, United States*, **Sven Esche**, *Stevens Institute of Technology, Hoboken, NJ, United States*

11:11am – The Positive Effects of Using Social Networks in Courses of Applied Mechanics on Students' Performance

Technical Paper Publication. IMECE2018-87217

Miguel X. Rodriguez-Paz, Jorge A. Gonzalez-Mendivil, J. Asuncion Zarate-Garcia, Luis O. Peña-Ortega, *Tecnologico de Monterrey, Puebla, Puebla, Mexico*

11:32am – Assessment of Three-Dimensional CAD Models Using CAD Application Programming Interface

Technical Paper Publication. IMECE2018-87776

Sung-hwan Joo, *Grand Valley State University, Grand Rapids, MI, United States*

11:53am – Student Engagement Through Service Learning Project

Technical Presentation. IMECE2018-89923

Shah Alam, Ulan Dakeev, *Texas A&M University - Kingsville, Kingsville, TX, United States*

7-3 ENGINEERING ACCREDITATION, DATA COLLECTION, ASSESSMENT AND ABET

7-3-2 Engineering Accreditation, Data Collection, Assessment and ABET Session II

Third Floor, David L. Lawrence Convention Center, Room 316
2:05pm–3:50pm

Session Chair: Amir Karimi, *University of Texas-San Antonio, San Antonio, TX, United States*

2:05pm – OBACIS Analytics: The Catalogs

Technical Paper Publication. IMECE2018-88168
Mohamed Ismail, *University of Regina, Regina, SK, Canada*

2:26pm – Cooperation of Three Faculty Members in Assessment of Student Knowledge in Two Sections of an Undergraduate Course

Technical Presentation. IMECE2018-89562
Amir Karimi, Ender Finol, Randall Manteufel, *University of Texas at San Antonio, San Antonio, TX, United States*

2:47pm – Implementing the Wright State Model for Engineering Mathematics at University of Detroit Mercy

Technical Presentation. IMECE2018-89513
Shuvra Das, *University of Detroit Mercy, Detroit, MI, United States*

3:08pm – Mechanical Systems Senior Capstone Design Course Experiences

Technical Presentation. IMECE2018-89261
Raghu Echempati, *Kettering University, Flint, MI, United States*

7-7 PROBLEM SOLVING IN ENGINEERING EDUCATION, RESEARCH AND PRACTICE

7-7-1 Problem Solving in Engineering Education, Research and Practice – I

Third Floor, David L. Lawrence Convention Center, Room 315
2:05pm–3:50pm

Session Chair: Zbigniew Bzymek, *University of Connecticut, Storrs, CT, United States*

2:05pm – Finite Element Educational Program Improves Mechanical Engineering Technology Student Performance in the Finite Element Class

Technical Paper Publication. IMECE2018-86583
Serdar Ozlek, *New York City College of Technology, CUNY, Brooklyn, NY, United States*

2:26pm – Effective Approach to Teaching Stress and Deformation Analysis in Mechanical Engineering Design

Technical Paper Publication. IMECE2018-86732
Zbigniew Bzymek, *University of Connecticut, Storrs, CT, United States*

2:47pm – Post-Graduation Assessment of the Effectiveness of an Industrially Sponsored Senior Design Capstone Course

Technical Paper Publication. IMECE2018-86812
Vito Moreno, Bryan Weber, Thomas Barber, *University of Connecticut, Storrs, CT, United States*

3:08pm – The Effect of Psychological Strategies in Engineering Education

Technical Presentation. IMECE2018-88925
Mohammad Asaduzzaman Chowdhury, *Dhaka University of Engineering & Technology, Gazipur, Bangladesh*, Bengir Ahmed Shuvho, *Dhaka University of Engineering & Technology, Dhaka, Bangladesh*, Uttam Kumar Debnath, *Dhaka University of Engineering & Technology, Gazipur, Bangladesh*, Suman Das, *University of Saskatchewan, Saskatchewan, SK, Canada*, Md. Mir Sakib Ahmed, *Dhaka University of Engineering & Technology, Gazipur, Bangladesh*

3:29pm – Real (Out of This) World Education and Research: A Decade of Experience in Operating Professional Space Missions

Technical Presentation. IMECE2018-89122
Christopher Kitts, *Santa Clara University, Santa Clara, CA, United States*

7-6 FLUID MECHANICS, HEAT TRANSFER, EXPERIMENTS AND ENERGY SYSTEMS

7-6-1 Fluid Mechanics, Heat Transfer, Experiments and Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 316
4:00pm–5:45pm

Session Chair: Wael Mokhtar, *Grand Valley State University, Grand Rapids, MI, United States*

4:00pm – Fabrication and Plumbing Works Using Pipe Fusion Thermal Technology: A Mechanical Engineering Extension Service for the Drug Dependents

Technical Presentation. IMECE2018-89183
Ronald Galindo, *Cebu Technological University, Cebu City, Philippines*

4:21pm – An Experimental and Numerical Study on Airfoil Flow Characteristics: Evaluating the Problem-Solving Skills of Students

Technical Presentation. IMECE2018-89475
Sanjivan Manoharan, Dylan DiGiovanni, Jordan O'Hearn, *Grand Valley State University, Grand Rapids, MI, United States*

4:42pm – Macgyvering and Entrepreneurial Mindset Learning: Examples for the Thermodynamics Classroom

Technical Presentation. IMECE2018-89579
Natasha Vermaak, Yaozhong Zhang, Yangze Sun, *Lehigh University, Bethlehem, PA, United States*

5:03pm – Examples of Undergraduate Research Project in Thermodynamics: Generalized Correlations of Vapor Pressure and Enthalpy of Vaporization

Technical Presentation. IMECE2018-89747

Amir Karimi, Joseph Stephen Fernandez, *University of Texas at San Antonio, Victoria, TX, United States*

7-7 PROBLEM SOLVING IN ENGINEERING EDUCATION, RESEARCH AND PRACTICE

7-7-2 Problem Solving in Engineering Education, Research and Practice – II

**Third Floor, David L. Lawrence Convention Center, Room 315
4:00pm–5:45pm**

Session Chair: Zbigniew Bzymek, *University of Connecticut, Storrs, CT, United States*

4:00pm – Using Engineering Equation Solver (EES) to Solve Engineering Problems in Mechanical Engineering

Technical Paper Publication. IMECE2018-86078

Haifa El-Sadi, *Wentworth Institute of Technology, Boston, MA, United States*

4:21pm – Problem Based Learning: Generating a 3D Educational Brain Model to Engage Undergraduate Engineering Honors Students

Technical Paper Publication. IMECE2018-87197

Connie Gomez, Sheema Nasir, *San Jacinto College, Houston, TX, United States*

4:42pm – Hands-on Experiences for Problem Solving in Engineering Education Based on Trees and Plants

Technical Paper Publication. IMECE2018-87583

Gustavo Vargas-Silva, *University of the Basque Country, San Sebastian, Gipuzkoa, Spain*, **Mariappan Jawaharlal**, *California State Polytechnic University, Pomona, Pomona, CA, United States*

5:03pm – Strategies to Address “Design Thinking” in Engineering Curriculum

Technical Paper Publication. IMECE2018-87816

Devdas Shetty, Jiajun Xu, *University of the District of Columbia, Washington, DC, United States*

TRACK 8 ENERGY

- 8-1-1: Energy-Related Multidisciplinary – 1
- 8-1-2: Energy-Related Multidisciplinary – 2
- 8-2-1: Energy and Exergy Analysis of Power Cycles
- 8-2-2: Thermodynamics of Cooling and Thermal Processes
- 8-2-3: Chemical Thermodynamic Processes
- 8-2-4: On Entropy and Irreversibilities' Minimization
- 8-3-1: Thermoeconomics
- 8-4-1: Advanced Power Cycles
- 8-4-2: Improvement in Performance and Emissions of Energy Systems
- 8-4-3: Solar/Waste-Heat Power Generation
- 8-4-4: Engines Behaviour and Fuel Characteristics
- 8-4-5: Design and Analysis of Energy Systems – 1
- 8-4-6: Design and Analysis of Energy Systems – 2
- 8-5-1: Energy Systems Components – 1
- 8-5-2: Energy Systems Components – 2
- 8-6-1: Low-Temperature Energy Conversion Systems
- 8-7-1: Thermal Energy Storage – Devices I
- 8-7-2: Thermal Energy Storage – Materials
- 8-7-3: Thermal Energy Storage – Devices II
- 8-7-4: Thermal Energy Storage – Systems Integration
- 8-8-1: Environmental Aspects of Energy Systems
- 8-9-1: Cooling Technologies
- 8-9-2: Building Energy Generation
- 8-9-3: Building Structure/Materials for Load Reduction
- 8-10-1: Advanced Technologies for Wind Energy
- 8-10-2: Advanced Technologies for Solar Energy
- 8-10-3: Advanced Technologies for Ocean Energy
- 8-10-4: Advanced Technologies for Wind Energy II
- 8-10-5: Advanced Technologies for Solar Energy II
- 8-10-6: Energy Storage, Energy Harvesting, and Electric Cars
- 8-10-7: Biomass, Geothermal, and Small Scale Generation
- 8-10-8: Feasibility and Techno-Economic Analysis of Renewable Energy Technologies
- 8-11-1: Lithium Ion Batteries – Design and Performance
- 8-11-2: Modeling Efforts in Batteries
- 8-11-3: Structural Analysis of Li-Ion Batteries
- 8-11-4: Thermal Aspects of Li-Ion Batteries
- 8-11-5: Beyond Li-Ion Batteries
- 8-12-1: PEM Fuel Cells – I
- 8-12-2: PEM Fuel Cells – II
- 8-12-3: Fuel Cell Systems and Infrastructure
- 8-14-1: Nuclear Power Plants: Design, Analysis, and Safety
- 8-15-1: CMS-Biofuel Systems and Processes
- 8-16-1: CMS-Biofuels Production, Conversion, and Simulation
- 8-17-1: Energy Plenary
- 8-13-1: Plenary

ACKNOWLEDGMENT

Track Organizers

Roberto Carapellucci, *University of L'Aquila, Italy*
Yunho Hwang, *University of Maryland, United States*
Christopher Depcik, *University of Kansas, United States*

Topic Organizers

Claudia Toro, *University of Rome Sapienza DMA, Italy*
Mahmoud Elsharafi, *Midwestern State University, United States*
Irene Koronaki, *NTUA, Greece*
Michael Nitsas, *National Technical University of Athens, Greece*
Vittorio Verda, *Politecnico di Torino – Dip Energetica Politech, Italy*
Roberto Capata, *University of Rome, Italy*
Andrea Lazzaretto, *University of Padua, Italy*
Adriano Sciacovelli, *University of Birmingham, United Kingdom*
Helena Navarro, *University of Birmingham, United Kingdom*
Jeyhoon Khodadadi, *Auburn University, United States*
Elisa Guelpa, *Politecnico di Torino – DENERG, Italy*
Yoshiharu Amano, *Waseda University, Tokyo, Japan*
Navid Goudarzi, *UNCC, United States*
Jim Kuo, *California State University – Los Angeles, United States*
Soumik Banerjee, *Washington State University, United States*
George Nelson, *University of Alabama in Huntsville, United States*
Partha Mukherjee, *Purdue University, United States*

Soumik Banerjee, *Washington State University, United States*
Hakan Ozaltun, *Idaho National Laboratory, United States*
Jovica Riznic, *Canadian Nuclear Safety Commission, Canada*
Yunye Shi, *St. Ambrose University, United States*
Seyed Allameh, *Northern Kentucky University, United States*
Albert Ratner, *University of Iowa, United States*
Seyed Allameh, *Northern Kentucky University, United States*
Mohsen Saffari Pour, *KTH Royal Institute of Technology, Sweden*
Ahmed Emara, *Faculty of Engineering Mattaria –Cairo, Egypt*

Session Organizers

Mahmoud Elsharafi, *Midwestern State University, United States*
Claudia Toro, *University of Rome Sapienza DMA, Italy*
Michael Nitsas, *National Technical University of Athens, Greece*
Tatiana Morosuk, *Technical University Berlin, Germany*
George Tsatsaronis, *Technical University of Berlin, Germany*
Vittorio Verda, *Politecnico di Torino – Dip Energetica Politech, Italy*
Khamid Mahkamov, *Northumbria University, United Kingdom*
Gregory Kowalski, *Northeastern University, United States*
Qun Chen, *Tsinghua University, China*
Auteliano A Santos, *Universidade Estadual de Campinas, Brazil*
Yousef Haseli, *Central Michigan University, United States*

Andrea Lazzaretto, *University of Padua, Italy*
Adriano Sciacovelli, *University of Birmingham, United Kingdom*
Maike Johnson, *German Aerospace Center (DLR), Germany*
Peiwen Li, *University of Arizona, United States*
Angel D. Ramirez, *Escuela Superior Politécnica del Litoral, ESPOL, Ecuador*
Elisa Guelpa, *Politecnico di Torino – DENERG, Italy*
Sayed M. Metwalli, *Cairo University, Egypt*
Hohyun Lee, *Santa Clara University, United States*
Navid Goudarzi, *UNCC, United States*
Emrah Celik, *University of Miami, United States*
Lea-Der Chen, *Texas A&M University-Corpus Christi, United States*
Jose C. Pascoa, *Universidade Da Beira Interior, Portugal*
Soumik Banerjee, *Washington State University, United States*
Partha Mukherjee, *Purdue University, United States*
Jovica Riznic, *Canadian Nuclear Safety Commission, Canada*
Hakan Ozaltun, *Idaho National Laboratory, United States*
Grant Hawkes, *Idaho National Laboratory, United States*
Yunye Shi, *St. Ambrose University, United States*
Seyed Allameh, *Northern Kentucky University, United States*
Albert Ratner, *University of Iowa, United States*

TRACK 8 ENERGY

MONDAY, NOVEMBER 12

8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

8-4-1 Advanced Power Cycles

Third Floor, David L. Lawrence Convention Center, Room 317
9:45am–11:30am

Session Chair: Khamid Mahkamov, *Northumbria University, Newcastle upon Tyne, United Kingdom*

Session Co-Chair: Roberto Carapellucci, *University of L'Aquila, L'Aquila, IT, Italy*

9:45am – Power and Efficiency Optimizations for an Open Cycle Two-Shaft Gas Turbine Power Plant

Technical Paper Publication. IMECE2018-86246
Huijun Feng, Wanli Zhang, Ling Chen, Shaojun Xia, *Naval University of Engineering, Wuhan, China*

10:06am – Novel Twin-Screw Stirling Cycle Machine for Cryogenic and Refrigeration Applications

Technical Paper Publication. IMECE2018-86853
Khamid Mahkamov, Irina Makhkamova, Fadi Kahwash, *Northumbria University, Newcastle upon Tyne, United Kingdom*

10:27am – Thermal Design and Performance Prediction of a Shell Condenser for Closed-Cycle Underwater Vehicles

Technical Paper Publication. IMECE2018-86999
Peiyu Chen, Hongbin Yan, Gongnan Xie, *Northwestern Polytechnical University, Xi'an, China*, Bengt Sunden, *Lund University, Lund, Sweden*

10:48am – Heat Pump-Organic Rankine Cycle (HP-ORC) Integrated Systems for Energy Storage Applications

Technical Presentation. IMECE2018-87442
Claudia Toro, *University of Rome Sapienza DMA, Rome, Italy*, Roberto Capata, Enrico Sciubba, *Univerersity of Rome, Rome, Italy*

11:09am – Thermodynamic Modeling of Allam Cycle

Technical Paper Publication. IMECE2018-88079
Najmus Saquib Sifat, Yousef Haseli, *Central Michigan University, MT Pleasant, MI, United States*

8-5 ENERGY SYSTEMS COMPONENTS

8-5-1 Energy Systems Components – 1

Third Floor, David L. Lawrence Convention Center, Room 306
9:45am–11:30am

Session Chair: Roberto Capata, *University of Rome, Roma, Italy*

9:45am – On Numerical Investigation of Water Injection to Screw Compressors

Technical Paper Publication. IMECE2018-86463
Sham Rane, *University of Oxford, Oxford, England, United Kingdom*, Ahmed Kovacevic, Nikola Stosic, *City University London, London, United Kingdom*, Graham Stuppel, *Jaecklin GmbH, Augsburg, Bavaria, Germany*

10:06am – A Performance Comparison for Electric and Hydraulic Motors

Technical Paper Publication. IMECE2018-86761
Mohammed Al-Mudhafar, Noah Manning, *University of Missouri – Columbia, Columbia, MO, United States*

10:27am – Design and Analysis of the Self-Powered Two-Lobe and Three-Lobe Continuous Mud-Pulse Turbo Siren

Technical Paper Publication. IMECE2018-87733
Xiaobo Peng, *Prairie View A&M University, Prairie View, TX, United States*, Diwei Zhang, *Prairie View A&M University, Cypress, TX, United States*

10:48am – A Reforming Characteristics of a Mid-Temperature Methane-Steam Reformer With Various Configurations

Technical Paper Publication. IMECE2018-88260
Kyungin Cho, Sangseok Yu, Jinwon Yun, *Chungnam National University, Daejeon, Korea (Republic)*

11:09am – Translator Dynamics and Performance Comparison on One- and Two-Cylinder Free Piston Engines

Technical Paper Publication. IMECE2018-88689
Mehar Bade, Nigel Clark, Parviz Famouri, PriyaankaDevi Guggilapu, *West Virginia University, Morgantown, WV, United States*

8-6 LOW-TEMPERATURE ENERGY CONVERSION SYSTEMS

8-6-1 Low-Temperature Energy Conversion Systems

Third Floor, David L. Lawrence Convention Center, Room 319
9:45am–11:30am

Session Chair: Andrea Lazzaretto, *University of Padua, Italy, Padova, Italy*

9:45am – Preliminary Design of a Lab-Scale Organic Rankine Cycle for Waste Heat Recovery Applications

Technical Paper Publication. IMECE2018-86434
Carlos Cabezas, José Mendoza, Iván Ponce, Rafael Cantorin, Daniel Gonzales, Jessica Estrella, Sergio Peralta, Cesar Celis, *Pontificia Universidad Católica del Perú, Lima, Peru*

10:06am – Comparative Exergy-Based Analysis of the LNG Regasification Integrated Into Air Separation Units With External or Internal Compression Process

Technical Presentation. IMECE2018-87551
Tatiana Morosuk, Stefanie Tesch, George Tsatsaronis, *Technical University of Berlin, Berlin, Germany*

10:27am – Exergy-Based and Economic Evaluation of Cryogenics-Based Energy Storage

Technical Presentation. IMECE2018-87572
Tatiana Morosuk, Sarah Hamdy, George Tsatsaronis, *Technical University of Berlin, Berlin, Germany*

10:48am – Low-Temperature Thermal Energy Harvesting Using Solid/Liquid Phase Change Materials

Technical Paper Publication. IMECE2018-87956

Guangyao Wang, Dong Sam Ha, Kevin G. Wang, *Virginia Tech, Blacksburg, VA, United States*

11:09am – Design and Optimization of Flow Thermo-Electrochemical Cell to Harvest Low Temperature Waste Heat

Technical Presentation. IMECE2018-89546

Ali Hussain Kazim, Aqib Javaid, Asif Mutahir, Muhammad Faraz, *University of Engineering and Technology, Lahore, Lahore, Punjab, Pakistan*

8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

8-11-1 Lithium Ion Batteries—Design and Performance

Third Floor, David L. Lawrence Convention Center, Room 318
9:45am–11:30am

Session Chair: Soumik Banerjee, *Washington State University, Pullman, WA, United States*

Session Co-Chair: George Nelson, *University of Alabama in Huntsville, Huntsville, AL, United States*

9:45am – Discovery and Development of a Fast Charging Li-Ion Battery

Technical Paper Publication. IMECE2018-87661

Teng Liu, Xiao-Guang Yang, *Pennsylvania State University, State College, PA, United States*, Chao-Yang Wang, *Pennsylvania State University, University Park, PA, United States*

10:06am – Predicting Second-Life Aging in Lithium-Ion Batteries Repurposed From Electric Vehicles Battery Packs

Technical Presentation. IMECE2018-88842

Daniela Galatro, Carlos Da Silva, Olivier Trescases, Zhe Gong, Cristina H. Amon, *University of Toronto, Toronto, ON, Canada*

10:27am – A Comprehensive Review of Deformation Induced Short Circuit (ISC) in Li-Ion Batteries

Technical Presentation. IMECE2018-88952

Golam Newaz, *Wayne State University, Ann Arbor, MI, United States*, Leela Mohana Reddy Arava, *Wayne State University, Farmington Hills, MI, United States*, Sanket Mundhe, *Wayne State University, Detroit, MI, United States*, Min Zhu, Omar Faruque, James Cheng, Saeed Barbat, *Ford Motor Company, Dearborn, MI, United States*

10:48am – Characterization of Transport Parameters in NMC Cathode Phases Using X-ray Microtomography Data

Technical Presentation. IMECE2018-88285

Thushananth Rajendra, *University of Alabama in Huntsville, Huntsville, AL, United States*, Aashutosh Mistry, *Purdue University, West Lafayette, IN, United States*, Xianghui Xiao, *Argonne National Laboratory, Lemont, IL, United States*, Partha Mukherjee, *Purdue University, West Lafayette, IN, United States*, George Nelson, *University of Alabama in Huntsville, Huntsville, AL, United States*

11:09am – Measurement of Mechanical Properties and Assessment of Mechanical Degradation of Solid Electrolyte Interphase (SEI) Formed With Carbonate-Based Electrolytes

Technical Presentation. IMECE2018-89471

Insun Yoon, Pradeep Guduru, *Brown University, Providence, RI, United States*

8-15 CMS-BIOFUEL PRODUCTION, GASIFICATION, AND COMBUSTION

8-15-1 CMS-Biofuel Systems and Processes

Third Floor, David L. Lawrence Convention Center, Room 316
9:45am–11:30am

Session Chair: Yunye Shi, *St. Ambrose University, Davenport, IA, United States*

Session Co-Chair: Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*

9:45am – Modeling Woody Biomass Torrefaction Process

Technical Paper Publication. IMECE2018-87974

Mahmudul Hasan, Yousef Haseli, *Central Michigan University, Mt. Pleasant, MI, United States*

10:06am – Experimental and Simulation Studies of Corn Kernel Gasification in a Double Air Stage Downdraft Reactor

Technical Paper Publication. IMECE2018-88010

Yunye Shi, *St. Ambrose University, Davenport, IA, United States*, Diego M. Yepes Maya, Regis Nascimento, *Federal University of Itajuba, Itajuba, MG, Brazil*, Tejasvi Sharma, Albert Ratner, *University of Iowa, Iowa City, IA, United States*, Electo E. Silva Lora, *Federal University of Itajuba, Itajuba, MG, Brazil*

10:27am – Physical (Steam) Activation of Post-Gasification Biochar Derived From Peach Pits

Technical Paper Publication. IMECE2018-88386

Andres Munoz-Hernandez, Sina Dehghan, Gerardo Diaz, *University of California – Merced, Merced, CA, United States*

10:48am – Design, Flame Analysis and Performance Evaluation of a Laboratory Scale Bio Lantern Fueled Using Cow-Tallow Bio-Diesel

Technical Presentation. IMECE2018-88991

Onyemazuwa A. Azaka, Emmanuel C. Nwadike, *Nnamdi Azikiwe University, Awka, Anambra State/South-Easter Nigerian, Nigeria*

11:09am – Design and Construction of a Laboratory Scale Lantern for bio Fuel-Biodiesel Combustion and Flame Structure Analysis

Technical Presentation. IMECE2018-88992

Emmanuel C. Nwadike, Onyemazuwa A. Azaka, Nnamdi Azikiwe University, Awka, Southeastern Nigeria, Nigeria

8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS

8-2-1 Energy and Exergy Analysis of Power Cycles

Third Floor, David L. Lawrence Convention Center, Room 306
1:45pm–3:30pm

Session Chair: Michael Nitsas, National Technical University of Athens, Zografou, Greece

1:45pm – Modeling and Performance Analysis of a Dual-Shaft Counter-Rotating Gas Turbine

Technical Paper Publication. IMECE2018-86146

Qiao Zhou, Chinese Academy of Sciences, Beijing, China, Zhao Yin, Chunqing Tan, Qing Gao, Yongsheng Tian, Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China

2:06pm – Triaxial Gas Turbine Performance Analysis for Variable Power Turbine Inlet Guide Vane Control Law Optimization

Technical Paper Publication. IMECE2018-86161

Tao Wang, Chinese Academy of Sciences, Beijing, China, Yongsheng Tian, Zhao Yin, Qing Gao, Chunqing Tan, Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China

2:27pm – Performance Comparison and Parametric Analysis of sCO₂ Power Cycles Configurations

Technical Paper Publication. IMECE2018-86843

Ali Alsagri, University of Dayton, Beavercreek, OH, United States, Andrew Chiasson, Ahmad A. Aljabr, University of Dayton, Dayton, OH, United States

2:48pm – Thermo-Economic Analysis of an Integrated Supercritical CO₂ Brayton Cycle and Multiple Effect Desalination Systems

Technical Paper Publication. IMECE2018-88409

Sattam Alharbi, Mohamed L. Elsayed, Louis Chow, University of Central Florida, Orlando, FL, United States

3:09pm – Exergy and Energy Analysis of a Combined Power Cycle

Technical Presentation. IMECE2018-88917

Almandhar AlNaamani, Sultan Qaboos University, Muscat, Muscat, Oman, Nabeel AlRawahi, Sultan Qaboos University, Al Khoud, Muscat, Oman

8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

8-4-2 Improvement in Performance and Emissions of Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 317
1:45pm–3:30pm

Session Chair: Gregory Kowalski, Northeastern University, Boston, MA, United States

Session Co-Chair: Roberto Carapellucci, University of L'Aquila, L'Aquila, IT, Italy

1:45pm – Thermodynamic Performance Study of the SOFC-GT-RC System Fueled by LNG With Zero-CO₂-Emission

Technical Paper Publication. IMECE2018-86115

Xiaoyu Yang, Hongbin Zhao, China University of Petroleum, Beijing, Beijing, China

2:06pm – MCFC-Based System for Active CO₂ Capture From Flue Gases

Technical Paper Publication. IMECE2018-86881

Roberto Carapellucci, Roberto Cipollone, Davide Di Battista, University of L'Aquila, L'Aquila, Italy

2:27pm – Methanol Production From Coal—Performance and Exergy Analysis of Synthesis Routes With an Entrained and a Moving Bed Gasifier

Technical Presentation. IMECE2018-87560

Tatiana Morosuk, Timo Blumberg, George Tsatsaronis, Technical University of Berlin, Berlin, Germany

2:48pm – Energy and Exergy Analysis of a Biomass Based Ceramic Plant

Technical Paper Publication. IMECE2018-88046

Diogo Esteves, Cândida Vilarinho, Manuel Eduardo Ferreira, Joana Carvalho, University of Minho, Guimarães, Portugal, Jorge Araújo, CVR - Centro para a Valorização de Resíduos, Guimarães, Portugal, Jose Teixeira, University of Minho, Guimarães, Portugal

3:09pm – Effect of Thermal Storage on the Performance of Residential Scale Hybrid Tri-Generation System

Technical Presentation. IMECE2018-88213

Varun Gaur, Vaibhav Sahdev, Northeastern University, Boston, MA, United States, Mansour Zenouzi, Wentworth Institute of Technology, Boston, MA, United States, Gregory Kowalski, Northeastern University, Boston, MA, United States

8-10 RENEWABLE ENERGY

8-10-1 Advanced Technologies for Wind Energy

Third Floor, David L. Lawrence Convention Center, Room 319
1:45pm–3:30pm

Session Chair: Christopher Depcik, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: Navid Goudarzi, *UNCC, Charlotte, NC, United States*

1:45pm – Large-Eddy Simulation of Offshore Wind Farms for Power Prediction

Technical Paper Publication. IMECE2018-87965

Micah Sandusky, *Boise State University, Boise, ID, United States*, **Rey DeLeon**, *University of Idaho, Moscow, ID, United States*, **Inanc Senocak**, *University of Pittsburgh, Pittsburgh, PA, United States*

2:06pm – Variable Twist Blade Transformation to Improve Wind Turbine Performance

Technical Paper Publication. IMECE2018-88433

Hamid Khakpour Nejadkhaki, John Hall, *University at Buffalo, State University of New York, Buffalo, NY, United States*

2:27pm – Wind Farm Micrositing Layout Optimization Using Stackelberg Game Theory Approach

Technical Presentation. IMECE2018-88978

Ramin Farajifijani, *Alfred University, Alfred, NY, United States*, **Saeed Ahmadian**, *University of Houston, Houston, TX, United States*, **Ehsan Ghotbi**, *Alfred University, Alfred, NY, United States*

2:48pm – Numerical Investigation and Optimization of Conventional VAWT in Combination with Convergent Nozzle

Technical Presentation. IMECE2018-88765

Mst Sunzida Ferdoues, Krishna Vijayaraghavan, *Simon Fraser University, North York, ON, Canada*

3:09pm – Mini Wind Turbine for Small Scale Power Generation and Storage (Archimedes Wind Turbine Model)

Technical Paper Publication. IMECE2018-88455

Michael Ozeh, Ashreet Mishra, Xiuling Wang, *Purdue University Northwest, Hammond, IN, United States*

8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

8-11-2 Modeling Efforts in Batteries

Third Floor, David L. Lawrence Convention Center, Room 318
1:45pm–3:30pm

Session Chair: Soumik Banerjee, *Washington State University, Pullman, WA, United States*

Session Co-Chair: Partha Mukherjee, *Purdue University, West Lafayette, IN, United States*

1:45pm – Machine Learning Based Understanding of Lithium-Ion Battery Performance Decay

Technical Presentation. IMECE2018-87162

Ankit Verma, Partha Mukherjee, *Purdue University, West Lafayette, IN, United States*

2:06pm – Sodium Ion Transport in Sodium Thiophosphate Glasses: An Ab Initio Molecular Dynamics Study

Technical Presentation. IMECE2018-88224

Aniruddha Dive, Scott Beckman, Soumik Banerjee, *Washington State University, Pullman, WA, United States*

2:27pm – A Computer Experiment Based Real Time Simulation Model for a Spirally-Wounded Lithium-Ion Cell

Technical Presentation. IMECE2018-88509

Chao Li, *Rutgers University, Piscataway, NJ, United States*, **Assimina Pelegri**, *Rutgers University, East Brunswick, NJ, United States*

2:48pm – Machine Learning Analysis of Degradation – Safety Interaction in Li-Ion Cells

Technical Presentation. IMECE2018-87819

Daniel Juarez-Robles, Partha Mukherjee, *Purdue University, West Lafayette, IN, United States*, **Judith Jeevarajan**, *Underwriters Laboratories Inc., Northbrook, IL, United States*

3:09pm – Reactive Force Field Based Molecular Dynamics Simulations to Investigate Sodium Ion Transport in Glassy Electrolytes

Technical Presentation. IMECE2018-88207

Aniruddha Dive, Scott Beckman, Soumik Banerjee, *Washington State University, Pullman, WA, United States*

8-16 CMS-BIOFUELS PRODUCTION, CONVERSION, AND SIMULATION

8-16-1 CMS-Biofuels Production, Conversion, and Simulation

Third Floor, David L. Lawrence Convention Center, Room 316
1:45pm–3:30pm

Session Chair: Albert Ratner, *University of Iowa, Iowa City, IA, United States*

Session Co-Chair: Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*

1:45pm – A Life Cycle Assessment of Biofuel Produced From Waste Cooking Oil

Technical Paper Publication. IMECE2018-86301
Sierra Spencer, Malia Scott, Nelson Macken, Swarthmore College, Swarthmore, PA, United States

2:06pm – Understanding the Effect of Oxygenated Biofuels Addition on Combustion Characteristics of Gasoline

Technical Paper Publication. IMECE2018-86490
Shrabanti Roy, Mississippi State University, Starkville, MS, United States, Saeid Zare, Omid Askari, Mississippi State University, Mississippi State, MS, United States

2:27pm – The Development of a Simple Alternative Hybrid Engine for Gasoline, LPG and Biogas

Technical Paper Publication. IMECE2018-86552
Anchasa Pramuanjaroenkij, Amarin Tongkratoke, Siriluk Phankhoksoong, Kasetsart University, Sakon Nakhon, Sakon Nakhon, Thailand, Sadik Kakac, Tobb University of Economics and Technology, Ankara, Turkey

2:48pm – Effect of Diethyl Ether on the Performance and Emission Characteristics of Diesel “Rice Bran Methyl Ester” Biogas Fueled Dual Fuel Diesel Engine

Technical Presentation. IMECE2018-89362
S.K. Mahla, IKG Punjab Technical University, Hoshiarpur, India, Haeng Muk Cho, Kongju National University, South Korea, Cheonan, Korea (Republic), Bhupendra Singh Cahauhan, Lovely Professional University, Phagwara, Punjab, India

8-1 ENERGY-RELATED MULTIDISCIPLINARY

8-1-1 Energy-Related Multidisciplinary – 1

Third Floor, David L. Lawrence Convention Center, Room 316
3:45pm–5:30pm

Session Chair: Mahmoud Elsharafi, *Midwestern State University, Wichita Falls, TX, United States*

Session Co-Chair: Claudia Toro, *University of Rome Sapienza DMA, Roma, Italy*

3:45pm – Deep Decarbonization of Total Global Energy: Hydrogen and Ammonia C-free Fuels versus Electricity as Integrated CO₂-Emission-Free Energy Systems

Technical Presentation. IMECE2018-86186
William Leighty, The Leighty Foundation, Juneau, AK, United States

4:06pm – Experimental Study of the Sustainability of a Renewable-Energy-Driven Residential System With Heating Loads

Technical Paper Publication. IMECE2018-86242
Takao Kakizaki, Kosuke Hirano, Norio Morohashi, Masahito Oguma, Nihon University, Koriyama, Fukushima, Japan

4:27pm – Wet Gas Compressor Operation and Performance

Technical Paper Publication. IMECE2018-86562
Martin Bakken, Tor Bjorge, Lars Eirik Bakken, Norwegian University of Science and Technology, Trondheim, Norway

4:48pm – Energy Mix Forecasting in Abu Dhabi Using Mixed Integer Linear Program

Technical Paper Publication. IMECE2018-87575
Moza Al Naimi, Mohamed Ali, Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir., Gento Mogi, University of Tokyo, Tokyo, Japan

5:09pm – Energy Efficient Metal Mesh Fog Filters to Simultaneously Harness Atmospheric Fog-Water and Remove VOCs

Technical Presentation. IMECE2018-89731
Ritwick Ghosh, Rakesh Sahu, Igor Zhitomirsky, McMaster University, Hamilton, ON, Canada, Ranjan Ganguly, Jadavpur University, Kolkata, West Bengal, India, Ishwar K. Puri, McMaster University, Hamilton, ON, Canada

8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS

8-2-2 Thermodynamics of Cooling and Thermal Processes

Third Floor, David L. Lawrence Convention Center, Room 315
3:45pm–5:30pm

Session Chair: Michael Nitsas, *National Technical University of Athens, Zografou, Greece*

3:45pm – Thermoeconomic Analysis of a Solar MVC Desalination System

Technical Paper Publication. IMECE2018-86212
Lei Gao, Gyeong Sung Kim, Yunho Hwang, *University of Maryland, College Park, MD, United States*

4:06pm – A Comparative Study of Solar-Driven Absorption Refrigeration Cycles- Effect of the Utilized Working Pair

Technical Presentation. IMECE2018-86864
Michael Nitsas, Irene Koronaki, *National Technical University of Athens, Zografou, Greece*

4:27pm – Thermal Analysis of Phase Change Materials by Utilizing Nanoparticles

Technical Paper Publication. IMECE2018-87026
Michael Nitsas, Irene Koronaki, Athanasios Beliotis, *National Technical University of Athens, Athens, Greece*

4:48pm – First and Second Law Analysis of a Flat Plate Collector Working With Nanofluids

Technical Paper Publication. IMECE2018-87782
Michael Nitsas, Irene Koronaki, Loukia Prentza, *National Technical University of Athens, Athens, Greece*

5:09pm – Experimental Investigation of Ejector Refrigeration System With Double Condensers

Technical Paper Publication. IMECE2018-88671
H.H. Sait, *King Abdulaziz University, Rabigh, Makkah, Saudi Arabia*, B.A. Habibullah, Nadim Turkman, *King Abdulaziz University, Jeddah, Saudi Arabia*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

8-4-3 Solar/Waste-Heat Power Generation

Third Floor, David L. Lawrence Convention Center, Room 317
3:45pm–5:30pm

Session Chair: Tatiana Morosuk, *Technical University Berlin, Berlin, Germany*

Session Co-Chair: Roberto Carapellucci, *University of L'Aquila, L'Aquila, IT, Italy*

3:45pm – Thermodynamic Performance Study on Solar-Assisted SOFC - GT Distributed Energy System Fueled by Methanol

Technical Paper Publication. IMECE2018-86114
Qinlong Hou, Hongbin Zhao, *China University of Petroleum, Beijing, Beijing, China*

4:06pm – Supercritical CO₂ Cycle Combined With Concentrated Solar Tower Technology

Technical Presentation. IMECE2018-87578
Tatiana Morosuk, Mohamed Noaman, George Tsatsaronis, *Technical University of Berlin, Berlin, Germany*

4:27pm – Exergy-Based Evaluation of a Waste-Heat Driven Tri-Generation System With CO₂ as Working Fluid

Technical Presentation. IMECE2018-87584
Tatiana Morosuk, Jing Luo, George Tsatsaronis, *Technical University of Berlin, Berlin, Germany*

4:48pm – Retrofitting Gas Turbine Units Parabolic Trough Concentrated Solar Power for Sustainable Electricity Generation

Technical Paper Publication. IMECE2018-87673
Mohamed Ali, Wael Alnahdi, Sara Al Shamsi, Wafaa Alantali, Shaikha Al Shehhi, *Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir.*

5:09pm – Development and Investigation of a Solar-Biogas Hybrid Brayton Cycle for 100 kW Power Generation

Technical Paper Publication. IMECE2018-87678
Saad Alshahrani, Abraham Engeda, *Michigan State University, East Lansing, MI, United States*

8-5 ENERGY SYSTEMS COMPONENTS

8-5-2 Energy Systems Components – 2

Third Floor, David L. Lawrence Convention Center, Room 306
3:45pm–5:30pm

Session Chair: Roberto Capata, *University of Rome, Roma, Italy*

3:45pm – Design and Testing of a Micro-Bubble Separation System

Technical Paper Publication. IMECE2018-86104
Jordan Farina, Christopher Manderson, Phillip Tran, Heather Dillon, *University of Portland, Portland, OR, United States*

4:06pm – Experimental Study of a Robust Foil Regenerator in the Oscillating Flow

Technical Paper Publication. IMECE2018-86702
Koji Yanaga, Songgang Qiu, Pawan Yadav, *West Virginia University, Morgantown, WV, United States*

4:27pm – Effect of Geometric Configuration and Back Plate Addition in Minichannel Solar Collectors

Technical Paper Publication. IMECE2018-87852
Julio Perez, Sai Kiran Hota, Gerardo Diaz, *University of California – Merced, Merced, CA, United States*

4:48pm – A Study of Water Transport of Hollow Fiber Membranes Over Various Operating Conditions

Technical Paper Publication. IMECE2018-88067
Jongmin Chae, Sangseok Yu, *Chungnam National University, Daejeon, Korea (Republic)*

5:09pm – Structural Analysis of Ground Mounted Solar Panel Array

Technical Paper Publication. IMECE2018-88526
Ashhar Tufail Mohammad, Barun Pratiher, *Indian Institute of Technology Jodhpur, Jodhpur, Rajasthan, India*

8-10 RENEWABLE ENERGY

8-10-2 Advanced Technologies for Solar Energy

Third Floor, David L. Lawrence Convention Center, Room 319
3:45pm–5:30pm

Session Chair: Christopher Depcik, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: Navid Goudarzi, *UNCC, Charlotte, NC, United States*

3:45pm – Thermal Modeling of Concentrated Photovoltaic Thermal System at Different Operating Conditions

Technical Paper Publication. IMECE2018-86899
Shah Alam, Rahul C. Yelamanchili, *Texas A&M University - Kingsville, Kingsville, TX, United States*

4:06pm – Harnessing of Solar Energy With and Without Tracking

Technical Presentation. IMECE2018-89922
Mehmet Sozen, *Grand Valley State University, Grand Rapids, MI, United States*, Md. Nahid Pervez, *Ford Motor Company, Palo Alto, CA, United States*

4:27pm – Optimization of Nano-Texture Parameters of CdTe/CdS Thin Film Solar Cells

Technical Paper Publication. IMECE2018-86858
Joshua Smay, Ola Rashwan, James Then, *Penn State-Harrisburg, Middletown, PA, United States*

4:48pm – Solar Photovoltaic Power Plant Development for a Desert Climate

Technical Paper Publication. IMECE2018-86588
Abdullah Alanezi, Mohammad Naraghi, *Manhattan College, Bronx, NY, United States*

5:09pm – Photovoltaic Solar Energy: Potentials and Outlooks

Technical Paper Publication. IMECE2018-86991
Williams S. Ebhota, Tien-Chien Jen, *University of Johannesburg, Johannesburg, South Africa*

8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

8-11-3 Structural Analysis of Li-ion Batteries

Third Floor, David L. Lawrence Convention Center, Room 318
3:45pm–5:30pm

Session Chair: George Nelson, *University of Alabama in Huntsville, Huntsville, AL, United States*

3:45pm – In Situ Measurement of Plane Strain Modulus of the Solid Electrolyte Interphase (SEI) on Lithium Metal Anodes in Ionic Liquid Electrolytes

Technical Presentation. IMECE2018-89473
Insun Yoon, Pradeep Guduru, *Brown University, Providence, RI, United States*

4:06pm – Tuning Electrode Structure to Improve the Rate Capability of Energy Dense Lithium Ion Batteries

Technical Presentation. IMECE2018-89998
Prehit Patel, Thushananth Rajendra, George Nelson, *University of Alabama in Huntsville, Huntsville, AL, United States*

4:27pm – Local Strain Assessment in Li-Ion Battery Layers Subjected to External Deformation

Technical Presentation. IMECE2018-88962
Golam Newaz, *Wayne State University, Ann Arbor, MI, United States*, Leela Mohana Reddy Arava, *Wayne State University, Farmington Hills, MI, United States*, Sanket Mundhe, *Wayne State University, Detroit, MI, United States*, Min Zhu, Omar Faruque, James Cheng, Saeed Barbat, *Ford Motor Company, Dearborn, MI, United States*

4:48pm – Real-Time Measurement of Phase Transformation in Electrode Materials by Integrating In Situ Picosecond Ultrasonics and Atomic Force Microscopy

Technical Presentation. IMECE2018-89477
Shaghayegh Rezazadeh Kalehbasti, LiWei Liu, Humphrey Maris, Pradeep Guduru, *Brown University, Providence, RI, United States*

5:09pm – Effect of Stress on the Li Diffusivity in Ge Electrode

Technical Presentation. IMECE2018-89295
Siva P.V. Nadimpalli, Rajasekhar Tripuraneni, Subhajit Rakshit, *New Jersey Institute of Technology, Newark, NJ, United States*

TUESDAY, NOVEMBER 13

8-17 ENERGY PLENARY

8-17-1 Energy Plenary

Third Floor, David L. Lawrence Convention Center, Room 302
8:00am–8:45am

8:00am – Thoughts on the Future of Power Generation: A Low Carbon Perspective

Plenary Presentation. IMECE2018-90099

Ahmed Ghoniem, *Massachusetts Institute of Technology, Cambridge, MA, United States*

8-1 ENERGY-RELATED MULTIDISCIPLINARY

8-1-2 Energy-Related Multidisciplinary – 2

Third Floor, David L. Lawrence Convention Center, Room 315
10:00am–11:45am

Session Chair: Claudia Toro, *University of Rome Sapienza DMA, Roma, Italy*

Session Co-Chair: Mahmoud Elsharafi, *Midwestern State University, Wichita Falls, TX, United States*

10:00am – Measurements of the Contact Angles for Various Fluids Which Are Widely Used in the Oilfields to Improve Oil Recovery

Technical Paper Publication. IMECE2018-86717

Mahmoud Elsharafi, Kelton Vidal, Rumelia Thomas, *Midwestern State University, Wichita Falls, TX, United States*

10:21am – On-Board State of Health Estimation of Lithium Ion Batteries With Incremental Capacity Analysis Based on Gaussian Function

Technical Paper Publication. IMECE2018-86902

Tongyi Liang, Lingjun Song, *Beihang University, Beijing, China*

10:42am – Effect of Nonlinear Characteristic of the Gas Turbine Engine Fuel System With Hardware-in-the-Loop

Technical Paper Publication. IMECE2018-86922

Jinwei Chen, Jingxuan Li, Shengnan Sun, Huisheng Zhang, *Shanghai Jiao Tong University, Shanghai, China*

11:03am – High Voltage Plasma Reactor for Treatment of Carbon Dioxide and Oxygen Generation

Technical Paper Publication. IMECE2018-87610

Kamau Wright, *University of Hartford, West Hartford, CT, United States*

11:24am – Mechanical Testing and Modeling of the Graphite Anode of Lithium-Ion Batteries

Technical Presentation. IMECE2018-89468

Wei Li, *Tsinghua University, Beijing, Beijing, China*, Juner Zhu, *Massachusetts Institute of Technology, Cambridge, MA, United States*, Xia Yong, *Tsinghua University, Beijing, Beijing, China*, Elham Sahraei Esfahani, *George Mason University, Fairfax, VA, United States*

8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS

8-2-3 Chemical Thermodynamic Processes

Third Floor, David L. Lawrence Convention Center, Room 311
10:00am–11:45am

Session Chair: George Tsatsaronis, *Technical University of Berlin, Berlin, Germany*

Session Co-Chair: Michael Nitsas, *National Technical University of Athens, Zografou, Greece*

10:00am – Ecological Performance of a Generalized Radiative System Light-Driven Engine (LDE) With [A]f [B] Reacting System Improved by Controlling Piston Motion

Technical Paper Publication. IMECE2018-86252

Huijun Feng, Kang Ma, Lingen Chen, Shaojun Xia, *Naval University of Engineering, Wuhan, China*

10:21am – Avoidable and Unavoidable Exergetic Destruction Analysis of a Nitric Acid Production Plant

Technical Paper Publication. IMECE2018-87495

Juan Fajardo, *Universidad Tecnológica de Bolívar, Cartagena, Colombia*, Harold Valle, *University of Puerto Rico, Cartagena, Cartagena, Colombia*, Ana Buelvas, *Universidad Tecnológica de Bolívar, Cartagena de Indias, Bolivar, Colombia*

10:42am – Advances in Combustion Irreversibility Analysis by Using a Heuristic Finite Increment Method

Technical Presentation. IMECE2018-89270

Yuejun Yan, Noam Lior, *University of Pennsylvania, Philadelphia, PA, United States*

11:03am – Influence of Advanced Injection Timing on Exergy Analysis of DI Diesel Engine Fuelled With Waste Cooking Oil Biodiesel

Technical Presentation. IMECE2018-89534

Veena Chaudhary, *Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, India*

11:24am – Extending Degree of Disequilibrium Analysis for Automatic Selection of Kinetic Constraints in the Rate-Controlled Constrained-Equilibrium Method

Technical Paper Publication. IMECE2018-86509

Fatemeh Hadi, *Tennessee State University, Nashville, TN, United States*, Vreg Yousefian, *Tennessee State University, Carlisle, MA, United States*, Ehsan Sarfaraz, *Tennessee State University, Nashville, TN, United States*, Gian Paolo Beretta, *Universita di Brescia, Brescia, Italy*

8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

8-4-4 Engines Behaviour and Fuel Characteristics

Third Floor, David L. Lawrence Convention Center, Room 316
10:00am–11:45am

Session Chair: Qun Chen, *Tsinghua University, Beijing, China*

Session Co-Chair: Roberto Carapellucci, *University of L'Aquila, L'Aquila, IT, Italy*

10:00am – Development of Test Rigs to Investigate Fluid Flow and Heat Transfer in a Stirling Engine Heater Head
Technical Paper Publication. IMECE2018-86378

Pawan Yadav, Songgang Qiu, Koji Yanaga, *West Virginia University, Morgantown, WV, United States*

10:21am – Power Flow Topology of Supercritical Carbon Dioxide Power Generation System and Its Application in Modeling and Optimization

Technical Paper Publication. IMECE2018-87272

Qun Chen, Xia Li, Xi Chen, *Tsinghua University, Beijing, China*

10:42am – Improvement in Thermal Efficiency of a Fuel Reforming Engine System Using Low Concentration Hydrous Ethanol

Technical Presentation. IMECE2018-87402

Yuzo Shirakawa, Atsushi Shiamda, Takao Ishikawa, *Hitachi, Ltd., Ibaraki, Japan*, Toshio Shudo, *Tokyo Metropolitan University, Tokyo, Japan*

11:03am – Lean-Burn Characteristics of a Heavy-Duty Diesel Engine Retrofitted to Natural Gas Spark Ignition
Technical Paper Publication. IMECE2018-87761

Jinlong Liu, Cosmin Dumitrescu, *West Virginia University, Morgantown, WV, United States*

11:24am – Effect of Piston Crevices on 3D Simulation of a Heavy-Duty Diesel Engine Retrofitted to Natural Gas Spark Ignition

Technical Paper Publication. IMECE2018-87783

Iolanda Stocchi, *University of Perugia, Morgantown, WV, United States*, Jinlong Liu, Cosmin Dumitrescu, *West Virginia University, Morgantown, WV, United States*,

Michele Battistoni, Carlo N. Grimaldi, *University of Perugia, Perugia, Italy*

8-10 RENEWABLE ENERGY

8-10-3 Advanced Technologies for Ocean Energy

Third Floor, David L. Lawrence Convention Center, Room 318
10:00am–11:45am

Session Chair: Navid Goudarzi, *UNCC, Charlotte, NC, United States*

10:00am – Gyroscopic Wave Energy Generator for Fish Farms and Rigs

Technical Paper Publication. IMECE2018-86188

Alexandra Norbach, *Western Norway University of Applied Sciences, Ågotnes, Norway*, Kotryna Bedrovaite Fjetland, *Western Norway University of Applied Sciences, Kverneland, Norway*, Gina Hestetun, Thomas Impelluso, *Western Norway University of Applied Sciences, Bergen, Bergen, Norway*

10:21am – River Turbines Controlled by Mechanical Speed Converters

Technical Paper Publication. IMECE2018-88417

Navid Goudarzi, *UNCC, Charlotte, NC, United States*, Kyung Soo Han, *DDMotion, Owings Mills, MD, United States*

10:42am – Design and Optimization of a Tidal Turbine and Farm

Technical Paper Publication. IMECE2018-86264

Mohammed Mayeed, *Kennesaw State University, Marietta, GA, United States*

11:03am – Effect of Oscillating Water Column Chamber Inclination on the Performance of a Savonius Rotor

Technical Paper Publication. IMECE2018-87313

Deepak Prasad, Mohammed Rafiuddin Ahmed, *University of the South Pacific, Suva, Fiji*, Young-Ho Lee, *Korea Maritime and Ocean University, Busan, Korea (Republic)*

11:24am – An Energy Harvester for Kuroshio Power

Technical Presentation. IMECE2018-88870

Bang-Fuh Chen, Shang-Yu Tsai, Wei-Ren Chen, *National Sun Yat-Sen University, Kaohsiung, Taiwan*

8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

8-11-4 Thermal Aspects of Li-ion Batteries

Third Floor, David L. Lawrence Convention Center, Room 317
10:00am–11:45am

Session Chair: Dervis Demirocak, *Texas A&M University-Kingsville, Kingsville, TX, United States*

10:00am – Effect of Thermal Gradient on Lithium Electrodeposition

Technical Presentation. IMECE2018-87621

Conner Fear, *Purdue University, Lafayette, IN, United States*

10:21am – A Hybrid Thermal Management System With Negative Parasitic Losses for Electric Vehicle Battery Packs

Technical Paper Publication. IMECE2018-86111
Shashank Arora, Kari Tammi, *Aalto University, Espoo, Finland*

10:42am – A Novel Technique for Estimation of the Solid Electrolyte Interphase Film Resistance for Li-Ion Batteries

Technical Paper Publication. IMECE2018-87311
Shashank Arora, *Aalto University, Espoo, Finland*

11:03am – Low-Temperature Energy Efficiency of Lithium-Ion Batteries

Technical Paper Publication. IMECE2018-86582
Ashkan Nazari, *Virginia Tech, Blacksburg, VA, United States*,
Roja Esmaeeli, Seyed Reza Hashemi, Haniph Aliniagerdroudbari, Siamak Farhad, *University of Akron, Akron, OH, United States*

8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS

8-2-4 On Entropy and Irreversibilities' Minimization
Third Floor, David L. Lawrence Convention Center, Room 311
1:45pm–3:30pm

Session Chair: Tatiana Morosuk, *Technical University Berlin, Berlin, Germany*

Session Co-Chair: Michael Nitsas, *National Technical University of Athens, Zografou, Greece*

1:45pm – An Easier Approach to Introduce Entropy in Undergraduate Thermodynamics Classes

Technical Paper Publication. IMECE2018-86510
Yousef Haseli, *Central Michigan University, MT Pleasant, MI, United States*

2:06pm – Exergy Analysis of a Machining Operation Using Finite Element (FE) Assisted Simulations

Technical Paper Publication. IMECE2018-88494
Mohamed Gadalla, *American University of Sharjah, Sharjah, United Arab Emir.*, Salman Pervaiz, *Rochester Institute of Technology - Dubai, Dubai, Dubai, United Arab Emir.*

2:27pm – Entropy Generation Minimization for Energy-Efficient Desalination

Technical Paper Publication. IMECE2018-88543
John Lienhard V, *Massachusetts Institute of Technology, Cambridge, MA, United States*

2:48pm – Spontaneous Violations of the Second Law of Thermodynamics, Nanoscale Fluid Mechanics, and Poromechanics

Technical Presentation. IMECE2018-88826
Martin Ostoja-Starzewski, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

3:09pm – Generalized Thermodynamic Dynamic-Optimization of Irreversible Processes

Technical Presentation. IMECE2018-88893
Lingen Chen, *Naval University of Engineering, Wuhan, China*

8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

8-4-5 Design and Analysis of Energy Systems – 1
Third Floor, David L. Lawrence Convention Center, Room 316
1:45pm–3:30pm

Session Chair: Auteliano A. Santos, *Universidade Estadual de Campinas, Campinas, SP, Brazil*

Session Co-Chair: Roberto Carapellucci, *University of L'Aquila, L'Aquila, IT, Italy*

1:45pm – Ecological Optimization for an Endoreversible Chemical Pump With Three Mass Reservoirs

Technical Paper Publication. IMECE2018-86250
Lingen Chen, DAN Xia, Huijun Feng, Shaojun Xia, *Naval University of Engineering, Wuhan, China*

2:06pm – Mechanical Design of Magnetic Gearboxes Optimized for Assembly

Technical Paper Publication. IMECE2018-86878
Sina Modaresahmadi, Casey Nichols, Wesley Williams, *University of North Carolina at Charlotte, Charlotte, NC, United States*

2:27pm – Design of a Ducted Cross-Flow Turbine for Marine Current Energy Extraction

Technical Paper Publication. IMECE2018-87324
Jai N. Goundar, Deepak Prasad, Mohammed Rafiuddin Ahmed, *University of the South Pacific, Suva, Fiji*

2:48pm – Vibration Energy Harvesting to Power Ultrasonic Sensors in Heavy Haul Railway Cars

Technical Paper Publication. IMECE2018-87836
Auteliano A. Santos, Matheus V. Lopes, Vanessa V. Goncalves, Jony Eckert, *University of Campinas, Campinas, SP, Brazil*, Thiago S. Martins, *VALE S.A., Vitoria, ES, Espirito Santo, Brazil*

3:09pm – Reverberatory Furnace CFD Modeling for Efficient Design: Burners and Chimney Location

Technical Paper Publication. IMECE2018-87843
Mohamed Ali, Saeed Alshehhi, *Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir.*

8-10 RENEWABLE ENERGY

8-10-4 Advanced Technologies for Wind Energy II

Third Floor, David L. Lawrence Convention Center, Room 318
1:45pm–3:30pm

Session Chair: Navid Goudarzi, *UNCC, Charlotte, NC, United States*

Session Co-Chair: Christopher Depcik, *University of Kansas, Lawrence, KS, United States*

1:45pm – Self-Excited Induction Generator (SEIG) for Hydrogen and Ammonia C-Free Fuel Production Without Electricity Grid Connection

Technical Presentation. IMECE2018-87527

William Leighty, *The Leighty Foundation, Juneau, AK, United States*, **Eduard Muljadi**, *Auburn University, Auburn, AL, United States*

2:06pm – CFD Analysis of a Cross-Flow Turbine for Wind and Hydrokinetic Applications

Technical Paper Publication. IMECE2018-88469

Arian Hosseini, *KTH Royal Institute of Technology, Stockholm, Sweden*, **Navid Goudarzi**, *UNCC, Charlotte, NC, United States*

2:27pm – Wind Energy Assessment of Michigan City, United States

Technical Paper Publication. IMECE2018-88412

Michael Okorie, **Uzumma O. Ozeh**, **Xiuling Wang**, *Purdue University Northwest, Hammond, Armenia*

2:48pm – The Value of Energy Flexibility: Integrating Wind Resources in New York State

Technical Paper Publication. IMECE2018-87521

Terence Conlon, **Vijay Modi**, **Michael Waite**, *Columbia University, New York, NY, United States*

8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE

8-11-5 Beyond Li-ion Batteries

Third Floor, David L. Lawrence Convention Center, Room 317
1:45pm–3:30pm

Session Chair: Dervis Demirocak, *Texas A&M University-Kingsville, Kingsville, TX, United States*

1:45pm – Development of a Membraneless Organic Redox Flow Battery

Technical Paper Publication. IMECE2018-88024

Korey Cook, **Andre Benard**, *Michigan State University, East Lansing, MI, United States*, **Tom Guarr**, **Shane Mann**, *Michigan State University Bioeconomy Institute, Holland, MI, United States*, **Ethan Lau**, **Jordan Thayer**, *Michigan State University, East Lansing, MI, United States*

2:06pm – CNT Reinforced Polymer Nanocomposites for Thermochemical Energy Conversion and Storage

Technical Presentation. IMECE2018-89525

Oluwafunmilola Ola, **Yanqiu Zhu**, *University of Exeter, Exeter, United Kingdom*

2:27pm – Robust Nitrogen-Doped Graphene on Metal Reduced Organic Framework Catalyst for Oxygen Reduction Reactions

Technical Presentation. IMECE2018-88936

Harsimranjit Singh, **Eon Soo Lee**, **Bharath Babu Nunna**, **Ashok Pullamsetty**, *New Jersey Institute of Technology, Newark, NJ, United States*

2:48pm – The Effect of Nanoscale Architecture on Ionic Diffusion in rGO/Aramid Nanofiber Structural Electrodes for Supercapacitors

Technical Presentation. IMECE2018-88911

Sarah Aderyani, **Haleh Ardebili**, *University of Houston, Houston, TX, United States*

3:09pm – Improving Oil and Gas Operations by Integration of Solid Oxide Fuel Cells in a Sustainable Manner

Technical Presentation. IMECE2018-88919

Khalid Al-Khori, **Yusuf Bicer**, **Muammer Koc**, **Hamad Bin Khalifa University, Doha, Qatar**

8-14 NUCLEAR POWER PLANTS: DESIGN, ANALYSIS, AND SAFETY

8-14-1 Nuclear Power Plants: Design, Analysis, and Safety

Third Floor, David L. Lawrence Convention Center, Room 315
1:45pm–3:30pm

Session Chair: Jovica Riznic, *Canadian Nuclear Safety Commission, Ottawa, ON, Canada*

Session Co-Chairs: **Hakan Ozaltun**, **Grant Hawkes**, *Idaho National Laboratory, Idaho Falls, ID, United States*

1:45pm – Probabilistic Properties of Steel for Nuclear Piping

Technical Paper Publication. IMECE2018-87054

Kleio Avrithi, *University of Houston - Downtown, Houston, TX, United States*

2:00pm – Thermal Transport in Defective Actinide Oxides

Technical Paper Publication. IMECE2018-87605

Alex Resnick, **Katherine Mitchell**, **Jungkyu Park**, **Hannah Maier**, **Eduardo Farfan**, **Tien Yee**, **Christian Velasquez**, *Kennesaw State University, Marietta, GA, United States*

2:15pm – Thermo-Hydro-Chemo-Mechanical Modeling of Bentonite Extrusion in the Near Borehole Crack

Technical Presentation. IMECE2018-87944

Mohammad Islam, *National Energy Technology Laboratory, Pittsburgh, PA, United States*

2:30pm – Thermal Model of the AGR-5/6/7 Experiment

Technical Presentation. IMECE2018-88628

Grant Hawkes, *Idaho National Laboratory, Idaho Falls, ID, United States*

2:45pm – Numerical Simulation of Sub-Cooled Water Flashing Flow From Nuclear Steam Generator Secondary Side Through Broken Feed Water Pipes

Technical Presentation. IMECE2018-88849

Jong Chull Jo, *Pusan National University/Korea Institute of Nuclear Safety, Busan, Korea (Republic)*, **Jae Jun Jeong**, **Byong Jo Yun**, *Pusan National University, Busan, Korea (Republic)*, **Soon-ho Kang**, *Korea Institute of Nuclear Safety, Daejeon, Korea (Republic)*

3:00pm – Thermo-Mechanical Performance Assessment of Selected Plates From MP-1 Low Power Experiments

Technical Paper Publication. IMECE2018-86010

Hakan Ozaltun, **Barry H. Rabin**, *Idaho National Laboratory, Idaho Falls, ID, United States*

8-3 THERMOECONOMICS

8-3-1 Thermoeconomics

**Third Floor, David L. Lawrence Convention Center, Room 317
3:45pm–5:30pm**

Session Chair: Vittorio Verda, *Politecnico di Torino, Torino, Italy*

3:45pm – Thermoeconomic Analysis of Reverse Brayton Cycle Based Cryocooler

Technical Paper Publication. IMECE2018-87190

Aman Kumar Dhillon, **Parthasarathi Ghosh**, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

4:06pm – Ground Level Integrated Diverse Energy Storage (GLIDES) Cost Analysis

Technical Paper Publication. IMECE2018-87517

Saiid Kassae, *University of Tennessee, Knoxville, TN, United States*, **Adewale Odukomaia**, *Oak Ridge National Laboratory/Georgia Tech, Oak Ridge, TN, United States*, **Ahmad Abu-Heiba**, **Xiaobing Liu**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Matthew M. Mench**, *University of Tennessee, Knoxville, TN, United States*, **Patrick W. O'Connor**, **Ayyoub M. Momen**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

4:27pm – Exergoeconomic Analysis Applied to a Novel Concept of Integrated Solar Combined Cycle

Technical Presentation. IMECE2018-87596

Tatiana Morosuk, **Louay Elmorsy**, **George Tsatsaronis**, *Technical University of Berlin, Berlin, Germany*

4:48pm – MED-MVC Systems: Exergy and Thermo-Economic Analysis Approach

Technical Presentation. IMECE2018-88361

Mohamed L. Elsayed, *University of Central Florida, Orlando, FL, United States*, **Osama Mesalhy**, *Zagazig University, Zagazig, Sharkia, Egypt*, **Ramy Mohammed**, **Louis Chow**, *University of Central Florida, Orlando, FL, United States*

5:09pm – Exergoeconomic Analysis of Intercooled, Reheated and Recuperated Gas Turbine Cycles With Air Film Blade Cooling

Technical Paper Publication. IMECE2018-88483

Mohamed Gadalla, **Waleed El-Damaty**, *American University of Sharjah, Sharjah, United Arab Emir.*

8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

8-4-6 Design and Analysis of Energy Systems – 2

**Third Floor, David L. Lawrence Convention Center, Room 316
3:45pm–5:30pm**

Session Chair: Yousef Haseli, *Central Michigan University, MT Pleasant, MI, United States*

Session Co-Chair: Roberto Carapellucci, *University of L'Aquila, L'Aquila, IT, Italy*

3:45pm – Specific Entropy Generation: A Measure of Inefficiencies in Power Plants

Technical Presentation. IMECE2018-88730

Yousef Haseli, *Central Michigan University, MT Pleasant, MI, United States*

4:06pm – A Novel Silica-Gel/Foam Packed Bed for Adsorption Cooling Applications

Technical Presentation. IMECE2018-88913

Ramy Mohammed, *University of Central Florida, Orlando, FL, United States*, **Osama Mesalhy**, *Zagazig University, Zagazig, Sharkia, Egypt*, **Mohamed L. Elsayed**, **Louis Chow**, *University of Central Florida, Orlando, FL, United States*

4:27pm – Development of Dynamic Model for Mechanical Vapor Recompression System Simulation

Technical Presentation. IMECE2018-89124

Le Wang, *Hefei General Machinery Research Institute Co. Ltd., Hefei, China*, **Guangbin Liu**, *Qingdao University of Science and Technology, Qingdao, China*, **Jun Xiao**, *Hefei General Machinery Research Institute Co. Ltd., Hefei, China*

4:48pm – Studying the Degradation of Platinum Based Proton Exchange Membrane Fuel Cells Using the Nanoscale X-Ray Computed Tomography Method

Technical Presentation. IMECE2018-89572

Jonathan Braaten, **Shohei Ogawa**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Venkata Yarlagadda**, *General Motors/University of Michigan, Ann Arbor, MI, United States*, **Anusorn Kongkanand**, *General Motors Company, Fuel Cell Activities, Pontiac, MI, United States*, **Shawn Litster**, *Carnegie Mellon University, Pittsburgh, PA, United States*

8-7 THERMAL ENERGY STORAGE

8-7-1 Thermal Energy Storage—Devices I

Third Floor, David L. Lawrence Convention Center, Room 315
3:45pm–5:30pm

Session Chair: Adriano Sciacovelli, *University of Birmingham, Birmingham, United Kingdom*

3:45pm – Longer Passage of Airflow in Multiple Packed-Bed Thin Tanks Versus in a Short Big Tank for Improved Thermal Storage Performance

Technical Paper Publication. IMECE2018-86123

Yan Wang, *Institute of Electrical Engineering, Chinese Academy of Sciences, Beijing, China*, **Peiwen Li**, *University of Arizona, Tucson, AZ, United States*, **Zhifeng Wang, Bei Yang, Guofeng Yuan**, *Institute of Electrical Engineering, Chinese Academy of Sciences, Beijing, China*, **Wenxun Tang**, *Guangdong Five Star Solar Energy, Dongguan, China*

4:06pm – Design and Integration of High Temperature Latent Heat Thermal Energy Storage for High Power Levels

Technical Paper Publication. IMECE2018-86281

Maike Johnson, *German Aerospace Center (DLR), Stuttgart, Germany*, **Bernd Hachmann**, *F. W. Brökelmann Aluminiumwerk GmbH & Co. KG, Ense, Germany*, **Andreas J. Dengel**, *Steag New Energies GmbH, Saarbruecken, Germany*, **Michael Fiß, Matthias Hempel, Dan Bauer**, *German Aerospace Center (DLR), Stuttgart, Germany*

4:27pm – Numerical Study of High Temperature Thermochemical Energy Storage Using $\text{Co}_3\text{O}_4/\text{CoO}$

Technical Paper Publication. IMECE2018-86329

Nasser Vahedi, Qasim A. Ranjha, Alparslan Oztekin, *Lehigh University, Bethlehem, PA, United States*

4:48pm – Analytical and Computational Thermal Analysis of a Latent Heat Storage and Cooling System (LHSCS)

Technical Presentation. IMECE2018-86565

Francisco Montero, Mario Di Capua, Amador Guzmán, *Pontificia Universidad Católica de Chile, Santiago, Chile*, **Daming Chen, Loreto Canales**, *Pontificia Universidad Católica de Chile, Macul, Region Metropolitana, Chile*

8-8 ENVIRONMENTAL ASPECTS OF ENERGY SYSTEMS

8-8-1 Environmental Aspects of Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 311
3:45pm–5:30pm

Session Chair: Angel D. Ramirez, *Escuela Superior Politécnica del Litoral, Guayaquil, Guayas, Ecuador*

Session Co-Chair: Elisa Guelpa, *Politecnico di Torino, Torino, Italy*

3:45pm – Modelling Produced Water Re-Injection Scaling Compability Performance in Matured Hydrocarbon Aquifer, Nigeria

Technical Paper Publication. IMECE2018-86126

Kingsley Abhulimen, Theophilus. A. Fashanu, *University of Lagos, Nigeria, Nigeria*, **Peter Idialu**, *Department of System Engineering, Lagos, Nigeria*

4:06pm – Some Studies on NOX Reduction From a Diesel Engine Using Stabilized Emulsion

Technical Paper Publication. IMECE2018-87374

Naveen Kumar, *Delhi Technological University, Delhi, Delhi, India*, **Harveer Singh Pali**, *JSS Academy of Technical Education, Noida, UP, India*, **Sidharth Bansal**, *MAIT, New Delhi, Delhi, India*

4:27pm – Mitigation of Greenhouse Gas Emissions Through the Shift From Fossil Fuels to Electricity in the Mass Transport System in Guayaquil, Ecuador

Technical Paper Publication. IMECE2018-87732

Angel D. Ramirez, Danilo Arcentales, Andrea J. Boero, *Escuela Superior Politécnica del Litoral, Guayaquil, Guayas, Ecuador*

4:48pm – Water Recovery in Cooling Towers

Technical Presentation. IMECE2018-88687

Maher Damak, Karim Khalil, Kripa Varanasi, *Massachusetts Institute of Technology, Cambridge, MA, United States*

5:09pm – Life-Cycle-Analysis of Novel Heat Exchanger for Dry Cooling of Power Plants Based on Encapsulated Phase Change Materials

Technical Presentation. IMECE2018-89633

Lige Zhang, Swanand Bhagwat, Sabrina Spatari, Ying Sun, *Drexel University, Philadelphia, PA, United States*

8-10 RENEWABLE ENERGY

8-10-5 Advanced Technologies for Solar Energy II

Third Floor, David L. Lawrence Convention Center, Room 318
3:45pm–5:30pm

Session Chair: Christopher Depcik, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: Navid Goudarzi, *UNCC, Charlotte, NC, United States*

3:45pm – Development of a Low Cost Self-Sustaining Water Distillation System Using Activated Carbon Nanofluids

Technical Paper Publication. IMECE2018-86906

Ashreet Mishra, *Purdue University Northwest, Hammond, IN, United States*, **A.G. Agwu Nnanna**, *University of Texas of the Permian Basin, Odessa, TX, United States*

4:06pm – Design and Testing of a Solar-Driven Wastewater Treatment Unit for Off-Grid Applications

Technical Paper Publication. IMECE2018-87090

Reza Baghaei Lakeh, *California State Polytechnic University, Pomona, Pomona, CA, United States*, **Daniel Andrade**, *California State Polytechnic University, Pomona, Los Angeles, CA, United States*, **Kyle Miller**, **Mohammad Modabernia**, **Thuan Nguyen**, **Elbon Flanagan**, **Johnny Baradii**, **John Kest**, **David Jacobo**, **Justine Nguyen**, **Laura Lopez**, **Binh Phun**, *California State Polytechnic University, Pomona, Pomona, CA, United States*, **Saied Delagah**, *U.S. Bureau of Reclamation, Denver, CO, United States*, **Mohammadali Sharbatmaleki**, *California State Polytechnic University, Pomona, Pomona, CA, United States*

4:27pm – Numerical Study of Nanofluid-Based Solar Collector for Humidification-Dehumidification (HDH) Desalination

Technical Paper Publication. IMECE2018-87318

Kapil Garg, *Indian Institute of Technology Ropar, Rupnagar, PB, Punjab, India*, **Vikrant Khullar**, *Thapar Institute of Engineering and Technology, Patiala, India, Patiala, Punjab, India*, **Sarit Kumar Das**, **Himanshu Tyagi**, *Indian Institute of Technology Ropar, Rupnagar, PB, Punjab, India*

4:48pm – Performances Investigation of a SOFC-Based Distributed Energy System Integrated With Solar Thermochemical Process

Technical Presentation. IMECE2018-88392

Taixiu Liu, **Qibin Liu**, *Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China*, **Jing Lei**, *North China Electric Power University, Beijing, China*, **Jun Sui**, **Hongguang Jin**, *Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, Beijing, China*

WEDNESDAY, NOVEMBER 14

8-7 THERMAL ENERGY STORAGE

8-7-2 Thermal Energy Storage—Materials

Third Floor, David L. Lawrence Convention Center, Room 323
10:00am–11:45am

Session Chair: Maike Johnson, *German Aerospace Center (DLR), Stuttgart, Germany*

Session Co-Chair: Adriano Sciacovelli, *University of Birmingham, Birmingham, United Kingdom*

10:00am – The Origin of Hydrophilic Surface Functionalization-Induced Thermal Conductance Enhancement across Solid-Water Interfaces

Technical Presentation. IMECE2018-86409

Dezhao Huang, **Ruimin Ma**, *University of Notre Dame, South Bend, IN, United States*, **Tengfei Luo**, *University of Notre Dame, Notre Dame, IN, United States*, **Teng Zhang**, *Schrodinger Inc., New York, NY, United States*

10:21am – Experimental Study of Hygroscopy of Single and Different Mixtures of MgCl₂, KCl, NaCl, ZnCl₂ for Application as Heat Transfer Fluids in CSP

Technical Paper Publication. IMECE2018-86416

Xiaoxin Wang, **Qichao Hu**, **Xiankun Xu**, **Peiwen Li**, **Gil-Pyo Kim**, **Dominic Gervasio**, *University of Arizona, Tucson, AZ, United States*

10:42am – Thermal Analysis of a High-Temperature Heat Pipe-Assisted Thermal Energy Storage System With Nano-Enhanced Phase Change Material

Technical Paper Publication. IMECE2018-86481

Saeed Tiari, **Mahboobe Mahdavi**, **Virensinh Thakore**, **Stacy Joseph**, *Gannon University, Erie, PA, United States*

11:03am – Non-Isothermal Phase Change Behaviors of Binary Mixtures of D-Dulcitol and Pentaerythritol as Novel Heat Storage Materials

Technical Paper Publication. IMECE2018-87643

Xuefeng Shao, **Jun Wang**, **Liwu Fan**, *Zhejiang University, Hangzhou, Zhejiang, China*

11:24am – Atomistic Modelling and Experimental Characterization of Water Sorption Onto Silicoaluminophosphate Zeolites for Low Temperature Thermal Storage Applications

Technical Presentation. IMECE2018-89000

Eliodoro Chiavazzo, **Matteo Fasano**, **Gabriele Falciani**, *Politecnico di Torino, Torino, Italy*, **Vincenza Brancato**, *CNR - Istituto di Tecnologie Avanzate per l'Energia "Nicola Giordano," Messina, Italy*, **Valeria Palomba**, *Università di Messina, Messina, Italy*, **Pietro Asinari**, *Politecnico di Torino, Torino, Italy*, **Andrea Frazzica**, *CNR - Istituto di Tecnologie Avanzate per l'Energia "Nicola Giordano," Messina, Italy*

8-9 ENERGY SYSTEMS FOR BUILDINGS

8-9-1 Cooling Technologies

Third Floor, David L. Lawrence Convention Center, Room 319
10:00am–11:45am

Session Chair: Yunho Hwang, *University of Maryland, College Park, MD, United States*

10:00am – Thermal Performance of Earth-Air Heat Exchanger Systems for Cooling Applications in Residential Buildings

Technical Paper Publication. IMECE2018-86974
Fadi Ghaith, *Heriot Watt University Dubai Campus, Dubai, United Arab Emir.*, **Habib Ur Razaq**, *Heriot Watt University, Dubai, United Arab Emir.*

10:21am – Using Adsorption Cooling and Thermal Solar Collection for Residential Cooling Applications in Canada

Technical Paper Publication. IMECE2018-87246
Jordan McNally, Christopher Baldwin, Cynthia A. Cruickshank, *Carleton University, Ottawa, ON, Canada*

10:42am – Thermal Modeling of a Building Integrated Radiative Cooler for Space Cooling Applications

Technical Paper Publication. IMECE2018-87456
Ravita Lamba, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*, **Mehdi Zeyghami, David Young, D. Yogi Goswami**, *University of South Florida, Tampa, FL, United States*, **S.C. Kaushik**, *Indian Institute of Technology Delhi, New Delhi, New Delhi, India*

11:03am – Economical and Non-Invasive Residential Human Presence Sensing via Temperature Measurement

Technical Paper Publication. IMECE2018-88211
Chenli Wang, Hohyun Lee, *Santa Clara University, Santa Clara, CA, United States*

11:24am – Neural Network Based Bin Analysis for Indirect/Direct Evaporative Cooling of Modular Data Centers

Technical Paper Publication. IMECE2018-88502
Abhishek Uday Walekar, Ashwin Siddarth, *University of Texas at Arlington, Arlington, TX, United States*, **Abhishek Guhe**, *Mestex, A Division of Mestek Inc., Dallas, TX, United States*, **Nikita R. Sukthankar, Dereje Agonafer**, *University of Texas at Arlington, Arlington, TX, United States*

8-10 RENEWABLE ENERGY

8-10-6 Energy Storage, Energy Harvesting, and Electric Cars

Third Floor, David L. Lawrence Convention Center, Room 325
10:00am–11:45am

Session Chair: Emrah Celik, *University of Miami, Pinecrest, FL, United States*

10:00am – Increasing Energy Efficiency in Vehicles by Harvesting Wasted Engine Heat

Technical Paper Publication. IMECE2018-88253
Emrah Celik, *University of Miami, Pinecrest, FL, United States*, **Mutabe Aljaghtham**, *University of Miami, Miami, FL, United States*

10:21am – Enhancement of Thermoelectric Figure of Merit of Bi₂Te₃ Using Carbon Dots

Technical Paper Publication. IMECE2018-88280
Emrah Celik, *University of Miami, Pinecrest, FL, United States*, **Cagri Oztan**, *University of Miami, Coral Gables, FL, United States*, **Yiqun Zhou, Roger LeBlanc**, *University of Miami, Miami, FL, United States*, **Sedat Ballikaya, Oguz Genc**, *Istanbul University, Istanbul, Turkey*

10:42am – Design and Fabrication of Three Stages Solar Still With Two Focal Concentric Collectors

Technical Presentation. IMECE2018-89027
Fayadh Abed, Khalil Farhan, Muhammad Eleiwi, *Tikrit University, Tikrit, SalahAdeen, Iraq*

11:03am – Evaluation of Thermal Energy Storage (TES) Systems on Thermo-Economic Characteristics of PTSC Solar-Based Power Generation Plants

Technical Paper Publication. IMECE2018-88477
Mohamed Gadalla, Adnan Alashkar, *American University of Sharjah, Sharjah, United Arab Emir.*

11:24am – Magnets for Tomorrow

Technical Presentation. IMECE2018-89047
Anish B. Soman, Balendu Divakar, *SCMS School of Engineering and Technology, Ernakulam, Kerala, Kerala, India*, **Anoop Anilkumar, Soorya Nath K.U.**, *SCMS School of Engineering and Technology, Kerala, Kerala, India*

8-12 FUEL CELL SYSTEMS DESIGN AND APPLICATIONS

8-12-1 PEM Fuel Cells – I

Third Floor, David L. Lawrence Convention Center, Room 324
10:00am–11:45am

Session Chair: Dervis Demirocak, *Texas A&M University-Kingsville, Kingsville, TX, United States*

10:00am – Investigation of Cell Reversal of Polymer Electrolyte Fuel Cells in Freezing Conditions

Technical Presentation. IMECE2018-89394

Leiming Hu, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Bo Ki Hong**, **Jong-Gil Oh**, *Hyundai Motor Company, Yongin-si, Gyeonggi-do, Korea (Republic)*, **Shawn Litster**, *Carnegie Mellon University, Pittsburgh, PA, United States*

10:21am – Electrode and Membrane Development for Anion Exchange Membrane Fuel Cells

Technical Presentation. IMECE2018-89428

Dylan Ritter, **Leiming Hu**, **Megan Treichel**, **Tyler Womble**, **Kevin Noonan**, **Shawn Litster**, *Carnegie Mellon University, Pittsburgh, PA, United States*

10:42am – Enhanced Water Management for Platinum Group Metal-Free Polymer Electrolyte Fuel Cells by Engineered Gas Diffusion Layers

Technical Presentation. IMECE2018-89565

Lisa Langhorst, **Aman Uddin**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Hanguang Zhang**, **Gang Wu**, *University at Buffalo, State University of New York, Buffalo, NY, United States*, **Shawn Litster**, *Carnegie Mellon University, Pittsburgh, PA, United States*

11:03am – Structural Analysis of MEA Considering Catalyst Layer Microstructure

Technical Presentation. IMECE2018-87385

Tomaru Ogawa, **Norio Saito**, **Shinichi Takahashi**, **Atsushi Ohma**, *Nissan Motor Co., Ltd., Yokosuka, Kanagawa, Japan*

11:24am – Nonequilibrium Thermodynamics Explains Thermal Osmosis in PEM Fuel Cells

Technical Presentation. IMECE2018-87853

Nicholas Ingarra, **Xia Wang**, *Oakland University, Rochester, MI, United States*

8-7 THERMAL ENERGY STORAGE

8-7-3 Thermal Energy Storage—Devices II

Third Floor, David L. Lawrence Convention Center, Room 323
1:45pm–3:30pm

Session Chair: Adriano Sciacovelli, *University of Birmingham, Birmingham, United Kingdom*

Session Co-Chair: Maike Johnson, *German Aerospace Center (DLR), Stuttgart, Germany*

1:45pm – Heat Transfer Analysis of a Low-Temperature Heat Pipe-Assisted Latent Heat Thermal Energy Storage System With Nano-Enhanced PCM

Technical Paper Publication. IMECE2018-86609

Mahboobe Mahdavi, **Saeed Tiari**, **Vivek Pawar**, *Gannon University, Erie, PA, United States*

2:06pm – Experimental and Numerical Study on Melting of Solar Salt in a Finned Metallic Container

Technical Paper Publication. IMECE2018-88072

Sol-Carolina Costa, **Khamid Mahkamov**, **Murat Kenisarin**, **Mohammad Ismail**, *Northumbria University, Newcastle upon Tyne, United Kingdom*, **Elvedin Halimic**, **David Mullen**, **Kevin Lynn**, **Thomas Werner**, *Aavid Thermacore Europe Ltd., Ashington, United Kingdom*

2:27pm – Layout of Phase Change Materials in a Thermal Energy Storage System

Technical Paper Publication. IMECE2018-88636

Habeeb Ur Rahman Khan, **Taha Aldoss**, **Muhammad Rahman**, *Wichita State University, Wichita, KS, United States*

2:48pm – Numerical Investigation of Thermal Performance for Plate Type PCM Thermal Storage Unit

Technical Paper Publication. IMECE2018-88667

Chen Mengdong, **Yang Cenyu**, **Jin Yi**, **Hu Xiao**, *Global Energy Interconnection Research Institute, Beijing, China*

8-9 ENERGY SYSTEMS FOR BUILDINGS

8-9-2 Building Energy Generation

Third Floor, David L. Lawrence Convention Center, Room 319
1:45pm–3:30pm

Session Chair: Sayed M. Metwalli, *Cairo University, Cairo, Egypt*

1:45pm – Energy Demand, Efficiency Measures and Embodied Energy in the Italian Residential Sector

Technical Paper Publication. IMECE2018-86400

Sara Abd Alla, **Vincenzo Bianco**, **Scarpa Federico**, **Luca Tagliafico**, *University of Genoa, Genoa, Italy*

2:06pm – Feasibility Analysis of Distributed Generation System for Large University Campus

Technical Paper Publication. IMECE2018-86477

Amy Allen, **Moncef Krarti**, *University of Colorado Boulder Boulder, CO, United States*

2:27pm – Evaluation of Optimal Designs for Hybrid Renewable Energy Systems Specific to Residential Communities in Saudi Arabia

Technical Paper Publication. IMECE2018-88090

Ammar H.A. Dehwah, Moncef Krarti, *University of Colorado Boulder, Boulder, CO, United States*

2:48pm – Potential Aggregate Effects of Net-Zero Energy Homes (NZEHS) With Distributed Energy Generation on the U.S. Electrical Grid

Technical Paper Publication. IMECE2018-88359

Dongsu Kim, Heejin Cho, Rogelio Luck, Pedro Mago, *Mississippi State University, Mississippi State, MS, United States*

3:09pm – Towards Net-Zero Energy Buildings: A Case Study in Humid Subtropical Climate

Technical Paper Publication. IMECE2018-88518

Owen G. Betharte, Hamidreza Najafi, Troy Nguyen, *Florida Institute of Technology, Melbourne, FL, United States*

8-10 RENEWABLE ENERGY

8-10-7 Biomass, Geothermal, and Small-Scale Generation

Third Floor, David L. Lawrence Convention Center, Room 325
1:45pm–3:30pm

Session Chair: Navid Goudarzi, *UNCC, Charlotte, NC, United States*

Session Co-Chair: Lea-Der Chen, *Texas A&M University-Corpus Christi, Corpus Christi, TX, United States*

1:45pm – Radiative Transport and Hydrodynamic Modeling of Microalgae Photosynthesis in Bio-Flow Reactors

Technical Paper Publication. IMECE2018-87116

Lea Der Chen, *Texas A&M University - Corpus Christi, Corpus Christi, TX, United States*

2:06pm – Hot Surface Ignition Properties of Jet-A/Canola Methyl Ester Blends in a Constant Volume Chamber

Technical Paper Publication. IMECE2018-87544

Bach Duong, *University of Oklahoma, Norman, OK, United States*, **Ramkumar N. Parthasarathy, Subramanya Gollahalli**, *University of Oklahoma, Norman, OK, United States*

2:27pm – Combustion Modelling of a 20 kW Pellet Boiler

Technical Paper Publication. IMECE2018-88063

Joao Silva, *University of Minho, Guimaraes, Portugal*, **Lelis Fraga**, *National University of East Timor, Dili, East Timor*, **Manuel Eduardo Ferreira**, *University of Minho, Guimaraes, Portugal*, **Sergio Chapela, Jacobo Porteiro**, *University of Vigo, Vigo, Spain*, **Senhorinha Teixeira, Jose Teixeira**, *University of Minho, Guimaraes, Portugal*

2:48pm – Improvement in Compost Waste Heat Recovery System Using LDPE Insulation

Technical Paper Publication. IMECE2018-88597

Nikhil Shrikant Mane, *PVPIT, Budhgaon, Sangli, Maharashtra, India*, **Narayanrao Hargude**, *RIT Sakharale, Budhgaon Maharashtra, India*, **Manoj Yadav**, *PVPIT, Budhgaon, Sangli, Maharashtra, India*, **Avinash Patil**, *SBGI, Miraj, Sangali, Maharashtra, India*, **Mukund L. Harugade**, *PVPIT, Budhgaon, Sangli, Maharashtra, India*

3:09pm – Exploration of Solar Hybridization and Thermal Energy Storage to Enhance Geothermal Power Generation and Dispatchability

Technical Presentation. IMECE2018-89596

Guangdong Zhu, *NREL, Englewood, CO, United States*, **Joshua Dominic McTigue**, *NREL, Golden, CO, United States*, **Kevin Kitz**, *Kitzworks, Boise, ID, United States*, **Greg Mungas**, *Hyperlight Energy, Riverside, CA, United States*, **Daniel Wendt**, *INL, Idaho Springs, ID, United States*

8-12 FUEL CELL SYSTEMS DESIGN AND APPLICATIONS

8-12-2 PEM Fuel Cells – II

Third Floor, David L. Lawrence Convention Center, Room 324
1:45pm–3:30pm

Session Chair: Partha Mukherjee, *Purdue University, West Lafayette, IN, United States*

1:45pm – Improving Thermal Performance of a PEMFC With Wavy Serpentine Flow Channels: A Parametric Study

Technical Paper Publication. IMECE2018-86145

Yuxin Jia, Hongbin Yan, *Northwestern Polytechnical University, Xi'an, China*, **Bengt Sunden**, *Lund University, Lund, Sweden*, **Gongnan Xie**, *Northwestern Polytechnical University, Xi'an, China*

2:06pm – Numerical Simulation of Droplet Emergence and Growth From Gas Diffusion Layers (GDLs) in Proton Exchange Membrane (PEM) Fuel Cell Flow Channels

Technical Paper Publication. IMECE2018-86579

Jingru Benner, Anthony Santamaria, Mehdi Mortazavi, *Western New England University, Springfield, MA, United States*

2:27pm – Modeling Three-Dimensional Complex Flow-Fields of Proton Exchange Membrane Fuel Cells With Gas Density Change in Cathode

Technical Paper Publication. IMECE2018-88388

Jinyong Kim, Chao-Yang Wang, *Pennsylvania State University, University Park, PA, United States*

2:48pm – Catalyst-scale Simulation of Transport and Reaction on 3D STEM-CT Images of Carbon-Supported Pt Catalyst for Polymer Electrolyte Fuel Cells
Technical Presentation. IMECE2018-89664

Shohei Ogawa, Carnegie Mellon University, Pittsburgh, PA, United States, Elliot Padgett, David A. Muller, Cornell University, Ithaca, NY, United States, Anusorn Kongkanand, General Motors Company, Fuel Cell Activities, Pontiac, MI, United States, Shawn Litster, Carnegie Mellon University, Pittsburgh, PA, United States

3:09pm – Optimization of Triple Phase Boundary Length in YSZ-Carbon-Nanotube Composites

Technical Presentation. IMECE2018-86946
Shiuan-Duo Chiang, Jordan Miller, Leila Ladani, University of Texas at Arlington, Arlington, TX, United States

8-7 THERMAL ENERGY STORAGE

8-7-4 Thermal Energy Storage—Systems Integration
Third Floor, David L. Lawrence Convention Center, Room 323
3:45pm–5:30pm

Session Chair: Peiwen Li, University of Arizona, Tucson, AZ, United States

3:45pm – Examining Ice Storage and Solar PV as a Potential Push Toward Sustainability for Qatar

Technical Paper Publication. IMECE2018-86709
Ibraheam Al-Aali, Vijay Modi, Columbia University, New York, NY, United States

4:06pm – Analysis of Phase Change Thermal Storage Configurations for Minichannel-Based Solar Collectors
Technical Paper Publication. IMECE2018-87837

Sai Kiran Hota, Julio Perez, Gerardo Diaz, University of California – Merced, Merced, CA, United States

4:27pm – Using Forecasted Daily Maximum Temperatures to Control a Chiller Thermal Storage System

Technical Paper Publication. IMECE2018-88307
Christopher Baldwin, Cynthia A. Cruickshank, Carleton University, Ottawa, ON, Canada

4:48pm – Novel Thermochemical Heat Storage System for Medium Temperature Range

Technical Presentation. IMECE2018-89845
Arpit Dwivedi, Manjunath Rajagopal, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Srirupa Ganguly, B.K. Sharma, Kishore Rajagopalan, Illinois Sustainable Technology Center, Champaign, IL, United States, Sanjiv Sinha, University of Illinois at Urbana-Champaign, Urbana, IL, United States

8-9 ENERGY SYSTEMS FOR BUILDINGS

8-9-3 Building Structure/Materials for Load Reduction

Third Floor, David L. Lawrence Convention Center, Room 319
3:45pm–5:30pm

Session Chair: Hohyun Lee, Santa Clara University, Santa Clara, CA, United States

3:45pm – Influence of Façade Area on Thermal Performance of Building for Cooling Purposes

Technical Paper Publication. IMECE2018-86033
Hamad Almutairi, Abdulrahman Almutairi, Jaber H. Almutairi, Public Authority for Applied Education and Training, Kuwait, Kuwait

4:06pm – Effect of Inlet Location on Ventilation Flow Through a Room Fitted With Solar Chimney

Technical Paper Publication. IMECE2018-87051
Kashif Nazir, University of Technology Sydney, Ultimo, NSW, Australia, B. Phuoc Huynh, University of Technology Sydney, Broadway NSW, Australia

4:27pm – Wood–Concrete Composite for Thermally Insulated Building Construction Material

Technical Paper Publication. IMECE2018-87340
Anuj Gupta, Harishchandra Thakur, Gautam Buddha University, Gautam Budh Nagar, Uttar Pradesh, India

4:48pm – A Numerical Approach for the Evaluation of the Energy Efficiency in Ventilated Façade

Technical Paper Publication. IMECE2018-87525
Massimo Milani, Luca Montorsi, Matteo Venturelli, University of Modena and Reggio Emilia, Reggio Emilia, Italy

5:09pm – Thermal Behavior of Soils Under Tidal Effect: A Case Study in Guayaquil, Ecuador

Technical Paper Publication. IMECE2018-87738
Daniel Moreira, Ruben Hidalgo-Leon, Escuela Superior Politécnica del Litoral, Guayaquil, Ecuador, Jose Macias, Instituto Nacional de Eficiencia Energética y Energías Renovables INER, Guayaquil, Ecuador, Guillermo E. Soriano, ESPOL Polytechnic University, Guayaquil, Guayas, Ecuador

8-10 RENEWABLE ENERGY

8-10-8 Feasibility and Techno-Economic Analysis of Renewable Energy Technologies

Third Floor, David L. Lawrence Convention Center, Room 325
3:45pm–5:30pm

Session Chair: Jose C. Pascoa, Universidade Da Beira Interior, Covilhã 6200, Portugal

3:45pm – Disc Turbine for Energy Harvesting

Technical Paper Publication. IMECE2018-88143
Jose C. Pascoa, Sílvio Cândido, Fernando Charrua-Santos, Antonio Espirito-Santo, Marco Canario, Universidade da Beira Interior, Covilhã, Portugal

4:06pm – How Solar and Storage Can Reduce Coincident Peak Loads and Payments: A Case Study in Austin, TX
Technical Paper Publication. IMECE2018-86482
Arkasama Bandyopadhyay, Joshua D. Rhodes, Julia P. Conger, Michael E. Webber, University of Texas at Austin, Austin, TX, United States

4:27pm – Annual Performance Investigation of Finned Double-Pass Solar Air Heater Installed in Sudan
Technical Presentation. IMECE2018-89024
Mohand H. Mohamed, Pennsylvania State University Harrisburg, Harrisburg, PA, United States, Issam Abu-Mahfouz, Pennsylvania State University Harrisburg, Middletown, PA, United States

4:48pm – Deep Decarbonization of Total Global Energy: Hydrogen and Ammonia C-Free Fuels Versus Electricity as Integrated CO₂-Emission-Free Energy Systems
Technical Presentation. IMECE2018-86187
William Leighty, The Leighty Foundation, Juneau, AK, United States

5:09pm – Performance of a Greenhouse Equipped With Light-Splitting Material and Desalination Unit
Technical Presentation. IMECE2018-89337
Sina Jahangiri Mamouri, James Klausner, Michigan State University, East Lansing, MI, United States, Ronggui Yang, University of Colorado, Boulder, CO, United States, Andre Benard, Michigan State University, East Lansing, MI, United States

8-12 FUEL CELL SYSTEMS DESIGN AND APPLICATIONS

8-12-3 Fuel Cell Systems and Infrastructure

Third Floor, David L. Lawrence Convention Center, Room 324
3:45pm–5:30pm

Session Chair: George Nelson, *University of Alabama in Huntsville, Huntsville, AL, United States*

3:45pm – Dynamic Behavior of a Solid Oxide Steam Electrolyzer System Using Transient Photovoltaic Generated Power for Renewable Hydrogen Production
Technical Paper Publication. IMECE2018-86685
Alireza Saeedmanesh, University of California, Irvine, Irvine, CA, United States, Paolo Colombo, Politecnico di Torino, Torino, Italy, Jack Brouwer, University of California, Irvine, Irvine, CA, United States

4:06pm – Resolving the Electrochemical Equations of a Solid Oxide Fuel Cell for Use in Transient Simulation and Integration Into Cyber-Physical Systems
Technical Paper Publication. IMECE2018-87770
Jesus Arias, Comas Haynes, Aklilu Giorges, Georgia Institute of Technology, Atlanta, GA, United States

4:27pm – Electrolyzer Exergy Analysis for an Environmental Control and Life Support System
Technical Paper Publication. IMECE2018-88119
Raymond Chow, University of Alabama in Huntsville, Huntsville, AL, United States, Jay Perry, NASA Marshall Space Flight Center, Huntsville, AL, United States, George Nelson, University of Alabama in Huntsville, Huntsville, AL, United States

4:48pm – Gaseous Fuel Leakage From Natural Gas Infrastructure
Technical Paper Publication. IMECE2018-88271
Nohora Hormaza Mejia, Jack Brouwer, National Fuel Cell Research Center/University of California, Irvine, Irvine, CA, United States

5:09pm – Assessments From an Expert Elicitation Workshop on the Cost, Performance, and Market Viability of Solid Oxide Fuel Cells
Technical Presentation. IMECE2018-89895
Michael Whiston, Inês Azevedo, Shawn Litster, Constantine Samaras, Kate S. Whitefoot, Jay F. Whitacre, Carnegie Mellon University, Pittsburgh, PA, United States

TRACK 9 FLUIDS ENGINEERING

- 9-11-1: Computational Modeling of Multiphase Flows**
- 9-11-2: Experimental Characterization of Complex Multiphase Flows**
- 9-11-3: Simulation of Multiphase Flows in Pumps and Complex Systems**
- 9-11-4: Modeling of Slug Flows, Separators and Shocks**
- 9-12-1: Multiphase Flow with Bio-Applications**
- 9-13-1: Industrial Flows – I**
- 9-13-2: Industrial Flows – II**
- 9-13-3: Industrial Flows – III**
- 9-14-1: Symposium on Wind Turbines Aerodynamics and Control**
- 9-15-1: 18th International Symposium on Measurement and Modeling of Environmental Flows**
- 9-16-1: Fluid Measurements and Instrumentation – I**
- 9-16-2: Fluid Measurements and Instrumentation – II**
- 9-17-1: Fluids Engineering Plenary**
- 9-17-2: Fluids Engineering Plenary II**
- 9-18-1: Young Engineers Paper (YEP) Contest**
- 9-2-1: Electric, Magnetic & Thermal Phenomena**
- 9-3-1: Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – I**
- 9-3-2: Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – II**
- 9-3-3: Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – III**
- 9-4-1: Fundamentals and Basic Research**
- 9-4-2: Computational Methods in Fluid Mechanics**
- 9-4-3: Fundamental Fluids Engineering and Applications**
- 9-5-1: CFD Applications for Flow Optimization and Control – I**
- 9-5-2: CFD Applications for Flow Optimization and Control – II**
- 9-5-3: CFD Applications for Flow Optimization and Control – III**

ACKNOWLEDGMENT

Track Organizers

Mark Duignan, *Savannah River National Laboratory, United States*
 Judith Bamberger, *Pacific Northwest National Laboratory, United States*

Topic Organizers

Dennis A. Siginer, *Botswana International University of Science and Technology & Universidad de Santiago de Chile*
 Boris Khusid, *New Jersey Inst of Tech, United States*
 Mhamed Boutaous, *Universite de Lyon, France*
 Sayavur Bakhtiyarov, *New Mexico Institute of Mining and Technology, United States*
 Wayne Strasser, *Eastman Chemical Co, United States*
 Stefan aus der Wiesche, *University of Applied Sciences Muenster, Germany*
 Khaled J. Hammad, *Central Connecticut State University, United States*
 Jun Chen, *Purdue University, United States*
 Zhongquan Charlie Zheng, *University of Kansas, United States*
 Ning Zhang, *McNeese State University, United States*
 Philipp Epple, *Coburg University of Applied Sciences, Germany*
 Emma Frosina, *University of Naples, Italy*
 Elia Merzari, *Argonne National Laboratory, United States*
 Surya Vanka, *University of Illinois, United States*
 S.A. Sherif, *University of Florida, United States*
 Yu-Tai Lee, *United States*
 Javid Bayandor, *State University of New York, United States*
 Khaled J. Hammad, *Central Connecticut State University, United States*
 Jingsen Ma, *Dynaflow, Inc., United States*
 Mohammad Hossan, *University of Central Oklahoma, United States*
 Jacek Wrobel, *poltechresearch.com, United States*
 Hongwei Sun, *University of Massachusetts Lowell, United States*
 Joseph Katz, *Johns Hopkins University, United States*

Tim O'Hern, *Sandia National Laboratories, United States*
 Marianne Francois, *Los Alamos National Laboratory, United States*
 Robert Kunz, *Penn State University, United States*
 Jingsen Ma, *Dynaflow, Inc., United States*
 Zhongquan Charlie Zheng, *University of Kansas, United States*
 Ning Zhang, *McNeese State University, United States*
 Alexandrina Untaroiu, *Virginia Tech, United States*
 George Chamoun, *Eastman Kodak, United States*
 Ivaylo Nedyalkov, *University of New Hampshire, United States*
 Nikhil Kumar Palakurthi, *University of Cincinnati, United States*
 Lyes Khezzer, *Khalifa University of Science and Technology, United Arab Emir.*
 Henry Foust, *University of St. Thomas, United States*
 Kevin Anderson, *California State Polytech University, United States*
 Majid Rashidi, *Cleveland State University, United States*
 Jinkook Lee, *Eaton, United States*
 Jaikrishnan Kadambi, *Case University, United States*
 Upendra Rohatgi, *Brookhaven National Laboratory, United States*
 Kashif Nawaz, *Oak Ridge National Laboratory | ORNL, United States*
 Stamatios Pothos, *TSI Incorporated, United States*
 Martin Wosnik, *University of New Hampshire, United States*
 Joel Park, *Naval Surface Warfare Center Carderock Division, United States*
 Judith Bamberger, *Pacific Northwest National Laboratory, United States*
 B. Terry Beck, *Kansas State Univ, United States*
 D. Keith Walters, *University of Oklahoma, United States*

Session Organizers

Dennis A. Siginer, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Chile*

Boris Khusid, *New Jersey Inst of Tech, United States*
 Mhamed Boutaous, *Universite de Lyon, France*
 John Buchanan, *UNNPP, United States*
 Wayne Strasser, *Eastman Chemical Co, United States*
 Taewoo Lee, *Arizona State Univ, United States*
 Zhongquan Charlie Zheng, *University of Kansas, United States*
 Ning Zhang, *McNeese State University, United States*
 Philipp Epple, *Coburg University of Applied Sciences, Germany*
 Emma Frosina, *University of Naples, Italy*
 Surya Vanka, *University of Illinois, United States*
 Jae Sung Park, *University of Nebraska-Lincoln, United States*
 Nazmul Islam, *University of Texas Rio Grande Valley, United States*
 Hongwei Sun, *University of Massachusetts Lowell, United States*
 Jacek Wrobel, *poltechresearch.com, United States*
 Marianne Francois, *Los Alamos National Laboratory, United States*
 Robert Kunz, *Penn State University, United States*
 Alexandrina Untaroiu, *Virginia Tech, United States*
 Kevin Anderson, *California State Polytech Univ, United States*
 Ivaylo Nedyalkov, *University of New Hampshire, United States*
 Nikhil Kumar Palakurthi, *University of Cincinnati, United States*
 Majid Rashidi, *Cleveland State University, United States*
 Kashif Nawaz, *Oak Ridge National Laboratory | ORNL, United States*
 Stamatios Pothos, *TSI Incorporated, United States*
 Ivaylo Nedyalkov, *University of New Hampshire, United States*

TRACK 9 FLUIDS ENGINEERING

TUESDAY, NOVEMBER 13

9-17 FLUIDS ENGINEERING PLENARIES**9-17-1 Fluids Engineering Plenary I**

Third Floor, David L. Lawrence Convention Center, Room 301
8:00am–8:45am

8:00am – Interface Actuations for Micro/Nano Fluidics
Plenary Presentation. IMECE2018-90100

Sung Kwon Cho, *University of Pittsburgh, Pittsburgh, PA, United States*

9-17 FLUIDS ENGINEERING PLENARIES**9-17-2 Fluids Engineering Plenary II**

Third Floor, David L. Lawrence Convention Center, Room 301
9:00am–9:45am

9:00am – Microfluidic Rheometry of Complex Fluids
Plenary Presentation. IMECE2018-90101

Gareth McKinley, *Massachusetts Institute of Technology, Cambridge, MA, United States*

9-3 25th SYMPOSIUM ON FLUID MECHANICS AND RHEOLOGY OF NONLINEAR MATERIALS AND COMPLEX FLUIDS

9-3-1 Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – I

Third Floor, David L. Lawrence Convention Center, Room 319
10:00am–11:45am

Session Chair: Dennis A. Siginer, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

Session Co-Chair: Mhamed Boutaous, *Universite de Lyon, Villeurbanne, France*

10:00am – Brownian Dynamics Simulations of Aggregation Phenomena in a Magnetic Particle Suspension With an Alternating Magnetic Field (Relationship Between the Aggregate Structure and the Heat Production)

Technical Paper Publication. IMECE2018-86544
Seiya Suzuki, Akira Satoh, Muneo Futamura, *Akita Prefectural University, Yuri-Honjo, Akita, Japan*

10:21am – The Effect of Porous Support Layer in Forward Osmosis Membranes: A Computational Fluid Dynamics Simulation

Technical Paper Publication. IMECE2018-86328
Ahmed M. Alshwairekh, Abdullah A. Alghafis, Mustafa Usta, Anas Alwatban, Robert M. Krysko, Alparslan Oztekin, *Lehigh University, Bethlehem, PA, United States*

10:42am – 3D Modeling of the Thermal Phenomena During Laser Melting of Polymers

Technical Paper Publication. IMECE2018-87549

Mhamed Boutaous, *Universite de Lyon, Villeurbanne, France*, **Aoulaiche Mokrane, Shihe Xin**, *INSA de Lyon, Villeurbanne, France*, **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

11:03am – Analysis of Melt Flows in an Electric Heating Furnace for Quartz Glass Synthesis

Technical Paper Publication. IMECE2018-86112

Qianli Ma, Haisheng Fang, *Huazhong University of Science & Technology, Wuhan, Hubei, China*, **Chunli Shang**, *Hubei Feilihua Quartz Glass Co., Ltd., Jingzhou, Hubei, China*, **Zhongyi Liu, Jing Wang**, *Huazhong University of Science & Technology, Wuhan, Hubei, China*

11:24am – 3D Monte Carlo Simulations on the Preferred Configuration of Cubic Hematite Particles in the Aggregate Structures

Technical Presentation. IMECE2018-86635

Kazuya Okada, Akira Satoh, Muneo Futamura, *Akita Prefectural University, Yuri-honjo, Akita, Japan*

9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS**9-5-1 CFD Applications for Flow Optimization and Control – I**

Third Floor, David L. Lawrence Convention Center, Room 323
10:00am–11:45am

Session Chair: Zhongquan Charlie Zheng, *University of Kansas, Lawrence, KS, United States*

Session Co-Chairs: Ning Zhang, *McNeese State University, Lake Charles, LA, United States*, Philipp Epple, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

10:00am – Investigation of Three-Dimensional Lagrangian Coherent Structures in Flow Past Single and Arrays of Plate: Linear Energy Harvesting Applications

Technical Paper Publication. IMECE2018-86332

Bashar Attiya, I-Han Liu, Cosan Daskiran, Muhannad Altimemy, Alparslan Oztekin, *Lehigh University, Bethlehem, PA, United States*

10:21am – High Resolution Overset Structured Grid RANS Simulations of Flow Past a Surface Mounted Cube Using Eddy Viscosity Closure Models

Technical Paper Publication. IMECE2018-86480

Marc Goldbach, *University of North Carolina at Charlotte, Tega Cay, SC, United States*, **Mesbah Uddin**, *North Carolina Motorsports and Automotive Research Center, Charlotte, NC, United States*

10:42am – Method to Reduce Drag Coefficient for Fuel Efficiency in Semi-Truck Trailer and Trailer Stability

Technical Paper Publication. IMECE2018-86584
Anu Nair, Fred Barez, San Jose State University, San Jose, CA, United States, Metin Ozen, Ozen Engineering, Inc., San Jose, CA, United States, Ernie Thurlow, San Jose State University, San Jose, CA, United States

11:03am – Effect of Underbody Geometry on the Fuel Efficiency of Gasoline and Electric Vehicles

Technical Paper Publication. IMECE2018-86629
Krishnaswamy Mahadevan, Fred Barez, Davood Abdollahian, Ernie Thurlow, San Jose State University, San Jose, CA, United States

11:24am – CFD Simulation of Multiphase Flow in Concentric Annuli

Technical Paper Publication. IMECE2018-86640
Amina Shynybayeva, Luis Rojas-Solorzano, Nazarbayev University, Astana, Kazakhstan, Kristian J. Sveen, Institute for Energy Technology, Kjeller, Norway

9-9 MICROFLUIDICS 2018—FLUID ENGINEERING IN MICRO- AND NANOSYSTEMS

9-9-1 Mathematical Modeling in Microfluidics
Third Floor, David L. Lawrence Convention Center, Room 324
10:00am–11:45am

Session Chair: Jae Sung Park, *University of Nebraska–Lincoln, Lincoln, NE, United States*

Session Co-Chair: Nazmul Islam, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

10:00am – Modelling on Predicting Pressure Distribution and Capacity of Foil Thrust Bearing

Technical Paper Publication. IMECE2018-86085
Zheng Xu, Fenzhu Ji, Yu Zhou, Shuiting Ding, Fanyong Wu, Beihang University, Beijing, China

10:21am – Combined Magnetohydrodynamic/Pressure Driven Flow of Multi-Layer Pseudoplastic Fluids Through a Parallel Flat Plates Microchannel

Technical Paper Publication. IMECE2018-86676
Juan R. Gomez, Juan P. Escandon, Instituto Politecnico Nacional, SEPI-ESIME Unidad Azcapotzalco, Ciudad de México, Mexico

10:42am – Theoretical and Numerical Analysis of Mixing of Confined Nanodroplets

Technical Presentation. IMECE2018-87826
Alireza Karbalaee, Hyoung Jin Cho, University of Central Florida, Orlando, FL, United States

11:03am – A Passive Stokes Flow Rectifier for Newtonian Fluids

Technical Presentation. IMECE2018-89658
Aryan Mehboudi, Junghoon Yeom, Michigan State University, East Lansing, MI, United States

11:24am – Spray Performance of Alternative Jet Fuel Based Nanofuels at High-Ambient Conditions

Technical Paper Publication. IMECE2018-87387
Mohamed Soltan, Buthaina Al Abdulla, Al Reem Al-Dosari, Kumaran Kannaiyan, Texas A&M University at Qatar, Doha, Qatar, Reza Sadr, Texas A&M University, College Station, TX, United States

9-18 YOUNG ENGINEERS PAPER (YEP) CONTEST

9-18-1 Young Engineers Paper (YEP) Contest
Third Floor, David L. Lawrence Convention Center, Room 325
10:00am–11:45am

Session Chair: B. Terry Beck, *Kansas State University, Manhattan, KS, United States*

Session Co-Chair: D. Keith Walters, *University of Oklahoma, Norman, OK, United States*

10:00am – Downwind Two-Bladed Wind Turbine Aerodynamic Performance Evaluation Implementing Actuator Line Model

Technical Paper Publication. IMECE2018-86549
Sebastian Henao, National University of Colombia, Marinilla, Antioquia, Colombia, Aldo G. Benavides, National University of Colombia, Medellín, Antioquia, Colombia, Omar D. López, Los Andes University, Bogota, Cundinamarca, Colombia

10:21am – The Effect of a Spanwise Body Force on Skin-Friction Reduction and Its Connections to Low-Drag States in Turbulent Flow

Technical Paper Publication. IMECE2018-86610
Jae Sung Park, Thomas Hafner, University of Nebraska–Lincoln, Lincoln, NE, United States

10:42am – Pulsatory Mixing of Laminar Flow Using Bubble-Driven Micro-Pumps

Technical Paper Publication. IMECE2018-86937
Brandon Hayes, Austin Hayes, Matthew Rolleston, James Krisher, Alexander Ferreira, Rochester Institute of Technology, Rochester, NY, United States

11:03am – The Impact of Adding a Labyrinth Surface to an Optimal Helical Seal Design

Technical Paper Publication. IMECE2018-87089
Wisher Paudel, Cori Watson, Houston G. Wood, University of Virginia, Charlottesville, VA, United States

11:24am – Comparing Fish-Inspired Ram Filters for Collection of Harmful Algae

Technical Paper Publication. IMECE2018-88797
Lauren Marshall, Adam Schroeder, Brian Trease, University of Toledo, Toledo, OH, United States

9-3 25th SYMPOSIUM ON FLUID MECHANICS AND RHEOLOGY OF NONLINEAR MATERIALS AND COMPLEX FLUIDS

9-3-2 Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – II

Third Floor, David L. Lawrence Convention Center, Room 319
1:45pm–3:30pm

Session Chair: Mhamed Boutaous, *Universite de Lyon, Villeurbanne, France*

Session Co-Chair: Dennis A. Siginer, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

1:45pm – Numerical Modeling of Phan-Thien-Tanner Viscoelastic Fluid Flow Through a Square Cross-Section Duct: Heat Transfer Enhancement due to Shear-Thinning Effects

Technical Paper Publication. IMECE2018-87568
Mhamed Boutaous, *Universite de Lyon, Villeurbanne, France*, **Fouad Hagani, Shihe Xin, Ronnie Knikker**, *INSA de Lyon, Villeurbanne, France*, **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

2:06pm – Resonance in Laminar Pipe Flow of Non-Linear Viscoelastic Fluids

Technical Paper Publication. IMECE2018-87973
Mario Letelier, *University of Santiago of Chile, Santiago, Chile*, **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*, **Diego Almendra, Juan Stockle**, *Universidad de Santiago de Chile, Santiago, Chile*

2:27pm – Rheology of Non-Dilute Suspensions of Deformable Particles in Newtonian Solvents Under Large Amplitude Oscillatory Shear (LAOS)

Technical Presentation. IMECE2018-89194
Christoph Kammer, Pedro Ponte Castañeda, *University of Pennsylvania, Philadelphia, PA, United States*

2:48pm – Rheological Characteristics of Surfactant-Based Fluids: A Comprehensive Study

Technical Paper Publication. IMECE2018-86044
Ahmed Kamel, *University of Texas of the Permian Basin, Odessa, TX, United States*

3:09pm – Study on the Numerical Analysis of In-Line Type Subsea Separator for Liquid-Liquid Mixture Flow

Technical Paper Publication. IMECE2018-87301
Young Ju Kim, Namsub Woo, Hyunji Kim, Sangmok Han, Jiho Ha, *Korea Institute of Geoscience and Mineral Resources, Pohang, Gyeongsangbuk-do, Korea (Republic)*, **Sunchul Huh**, *Gyeongsang National University, Tongyeong-si, Gyeongsangnam-do, Korea (Republic)*

9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS

9-5-2 CFD Applications for Flow Optimization and Control – II

Third Floor, David L. Lawrence Convention Center, Room 323
1:45pm–3:30pm

Session Chair: Zhongquan Charlie Zheng, *University of Kansas, Lawrence, KS, United States*

Session Co-Chairs: Ning Zhang, *McNeese State University, Lake Charles, LA, United States*, Philipp Eppe, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

1:45pm – Optimization of Curved Spacer Prototype Design for Flow Improvement in Centrifugal Pump Impeller

Technical Paper Publication. IMECE2018-87075
Munther Hermez, *Lawrence Technological University, Southfield, MI, United States*, **Badih Jawad**, *Lawrence Technological University, Dearborn Heights, MI, United States*, **Liping Liu, Sabah Abro**, *Lawrence Technological University, Southfield, MI, United States*

2:06pm – Influence of Blade Shape Geometry on Very Low Specific Speed Centrifugal Pump Performance

Technical Paper Publication. IMECE2018-87119
Muhamed Elsayed Albadawi, Ihab Adam, Sherif Haddara, Ahmed Elsherif, *Alexandria University, Alexandria, Egypt*

2:27pm – Efficiency Variation on a 4-Stage Low Speed Research Compressor With a Redesigned Cantilevered Stator

Technical Paper Publication. IMECE2018-87166
Zhenzhou Ju, Jinfang Teng, *Shanghai Jiao Tong University, Shanghai, China*, **Lin Fan, Yongjian Zhong**, *AECC Commercial Aircraft Engine Company, Shanghai, China*, **Xiao-Qing Qiang**, *Shanghai Jiao Tong University, Shanghai, China*

2:48pm – Surrogate Model Based Optimization for Chevron Foil Thrust Bearing

Technical Presentation. IMECE2018-87778
Gen Fu, *Alexandrina Untaroiu, Virginia Tech, Blacksburg, VA, United States*

3:09pm – Comparison of Experimental, Thermoelastohydrodynamic (TEHD) and Thermal, Non-Deforming Computational Fluid Dynamics (CFD) Results for Thrust Bearings: Part II

Technical Paper Publication. IMECE2018-87798
Xin Deng, Cori Watson, Minhui He, Houston G. Wood, Roger Fittro, *University of Virginia, Charlottesville, VA, United States*

9-9 MICROFLUIDICS 2018—FLUID ENGINEERING IN MICRO- AND NANOSYSTEMS

9-9-2 Droplet Microfluidics

Third Floor, David L. Lawrence Convention Center, Room 324
1:45pm–3:30pm

Session Chair: Hongwei Sun, *University of Massachusetts Lowell, Lowell, MA, United States*

1:45pm – Experimental Investigation on Newtonian Drop Formation in Different Continuous Phase Fluids

Technical Paper Publication. IMECE2018-86602
Ashkan Nazari, *Virginia Tech, Blacksburg, VA, United States,*
Arash Nazari, *K.N. Toosi University of Technology, Tehran, Iran*

2:06pm – Droplet Mixing Based on Thermotaxis

Technical Presentation. IMECE2018-87730
Alireza Karbalaeei, Ranganathan Kumar, Hyoung Jin Cho,
University of Central Florida, Orlando, FL, United States

2:27pm – Forced Wetting of Liquids Using Ultrasonic Surface Vibration

Technical Paper Publication. IMECE2018-87832
Matthew Trapuzzano, Nathan Crane, Rasim Guldiken, Andres Tejada-Martinez,
University of South Florida, Tampa, FL, United States

2:48pm – Preliminary Investigation of the Effect of Dielectrophoresis on Colloidal Transport and Deposition in Evaporating Droplets

Technical Paper Publication. IMECE2018-88054
Xi Li, Kara L. Maki, Michael Schertzer, *Rochester Institute of Technology, Rochester, NY, United States*

3:09pm – Study of Gas-Liquid Droplet Microfluidics in Confined Flow Focusing Geometries for Enhanced Droplet Generation

Technical Presentation. IMECE2018-89904
Pooyan Tirandazi, Julian D. Arroyo, Dac Duc Ho, Carlos H. Hidrovo, *Northeastern University, Boston, MA, United States*

9-11 14th FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW

9-11-1 Computational Modeling of Multiphase Flows
Third Floor, David L. Lawrence Convention Center, Room 325
1:45pm–3:30pm

Session Chair: Joseph Katz, *Johns Hopkins University, Baltimore, MD, United States*

Session Co-Chair: Marianne Francois, *Los Alamos National Laboratory, Los Alamos, NM, United States*

1:45pm – An Accurate Unstructured Finite Volume Discrete Boltzmann Method

Technical Paper Publication. IMECE2018-87136
Leitao Chen, Laura Schaefer, *Rice University, Houston, TX, United States,*
Xiaofeng Cai, *University of Delaware, Newark, DE, United States*

2:06pm – A Hyperbolicity Analysis of the 1991 OLGA's Model for Isothermal Flow

Technical Paper Publication. IMECE2018-87513
Carina N. Sondermann, Raphael V. Freitas, Rodrigo Patricio, Aline B. Figueiredo, Gustavo C.R. Bodstein,
Federal University of Rio de Janeiro, Rio de Janeiro, Brazil,
Felipe B. De F. Rachid, *Fluminense Federal University (PGMEC/UFF), Rio de Janeiro, Brazil,*
Renan Martins Baptista, *Petrobras, Rio de Janeiro, Brazil*

2:27pm – Numerical Study of Two-Phase Flow in a Horizontal Pipeline Using an Unconditionally Hyperbolic Two-Fluid Model

Technical Paper Publication. IMECE2018-87571
Raphael V. Freitas, Carina N. Sondermann, Rodrigo Patricio, Aline B. Figueiredo, Gustavo C.R. Bodstein,
Federal University of Rio de Janeiro, Rio de Janeiro, Brazil,
Felipe B. De F. Rachid, *Fluminense Federal University (PGMEC/UFF), Rio de Janeiro, Brazil,*
Renan Martins Baptista, *Petrobras, Rio de Janeiro, Brazil*

2:48pm – Interfacial Mobility Calculations From Random Atomistic Walks

Technical Presentation. IMECE2018-87957
Paul Barclay, Jennifer Lukes, *University of Pennsylvania, Philadelphia, PA, United States*

3:09pm – Investigation of Power-Law Shear Thinning Fluid Wicking in Capillary Channels by Two-Phase Direct Numerical Simulation With Volume-of-Fluid (VOF) Method

Technical Presentation. IMECE2018-89580
An Fu, Nikhil Kumar Palakurthi, *University of Cincinnati, Cincinnati, OH, United States,*
James Comer, *The Procter & Gamble Company, Cincinnati, OH, United States,*
Milind Jog, *University of Cincinnati, Cincinnati, OH, United States*

9-3 25th SYMPOSIUM ON FLUID MECHANICS AND RHEOLOGY OF NONLINEAR MATERIALS AND COMPLEX FLUIDS

9-3-3 Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids – III

Third Floor, David L. Lawrence Convention Center, Room 319
3:45pm–5:30pm

Session Chair: Mhamed Boutaous, *Universite de Lyon, Villeurbanne, France*

Session Co-Chair: Dennis A. Siginer, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

3:45pm – The Flow Structure of Annular Yield-Pseudoplastic Non-Newtonian Jets

Technical Presentation. IMECE2018-89383
Khaled J. Hammad, *Central Connecticut State University Simsbury, CT, United States*

4:06pm – The Effect of the Fluid Film Variable Viscosity on the Hydrostatic Thrust Spherical Bearing Performance in the Presence of Centripetal Inertia and Surface Roughness: Part 2—Recessed Fitted Bearing

Technical Paper Publication. IMECE2018-86029

Ahmad W.Y. Eleiscandarany, *Alex University, Alexandria, Egypt*

4:27pm – Herschel-Bulkley Fluid Flow Characteristics in a Duct With an Obstacle

Technical Paper Publication. IMECE2018-87092

Nariman Ashrafi, *IAU, Tehran, Iran*, Ali Sadeghi, Armin Chegini, *SRBIAU, Tehran, Iran*, Mehdi Shafahi, *IAU, Tehran, Iran*

4:48pm – Mixing Enhancement in a Novel Type of “Split and Recombine” Static Mixer

Technical Paper Publication. IMECE2018-88030

Charbel Habchi, *Notre Dame University - Louaize, Zouk Mosbeh, Lebanon*, Thierry Lemenand, *University of Angers, Angers, France*, Fouad Azizi, *American University of Beirut, Beirut, Lebanon*

5:09pm – Viscoplastic Fluid Flow Between Parallel Plates With Triangular Obstacles

Technical Paper Publication. IMECE2018-87105

Nariman Ashrafi, *IAU, Tehran, Iran*, Ali Sadeghi, Armin Chegini, *SRBIAU, Tehran, Iran*

9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS

9-5-3 CFD Applications for Flow Optimization and Control – III

Third Floor, David L. Lawrence Convention Center, Room 323
3:45pm–5:30pm

Session Chair: Zhongquan Charlie Zheng, *University of Kansas, Lawrence, KS, United States*

Session Co-Chairs: Ning Zhang, *McNeese State University, Lake Charles, LA, United States*, Philipp Epple, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

3:45pm – LES and Hybrid RANS-LES Simulation of a Pulsating Channel Flow

Technical Paper Publication. IMECE2018-87990

Tausif Jamal, *University of Oklahoma, Norman, OK, United States*, Huiyu Wang, *University of Oklahoma, Norman, OK, United States*, D. Keith Walters, *University of Oklahoma, Norman, OK, United States*

4:06pm – Transient Analysis of Air Flow in a Channel for Unconventional Radiator

Technical Paper Publication. IMECE2018-88327

Wahidul Islam, Jobaidur Khan, *University at Buffalo, State University of New York, Buffalo, NY, United States*

4:27pm – On Fine Tuning the SST $K - \omega$ Turbulence Model Closure Coefficients for Improved Prediction of Automotive External Flows

Technical Paper Publication. IMECE2018-88328

Chunhui Zhang, *University of North Carolina at Charlotte, Charlotte, NC, United States*, Mesbah Uddin, *North Carolina Motorsports and Automotive Research Center, Charlotte, NC, United States*, Christian Selent, *University of North Carolina at Charlotte, Charlotte, NC, United States*

4:48pm – Experimental Analysis of Air Flow in a Channel for Unconventional Radiator

Technical Paper Publication. IMECE2018-88332

Saad Salman, Rishabh Sharma, Kanishk Suri, Zeshan Khetani, Muhammad Taha Junaidy, Jonatan Meza, Jobaidur Khan, *University at Buffalo, State University of New York, Buffalo, NY, United States*

5:09pm – Effects of Double Noise Barriers on Highway Pollutant Dispersion Under Various Atmospheric Boundary Conditions

Technical Presentation. IMECE2018-88444

Liyuan Gong, Xiuling Wang, *Purdue University Northwest, Hammond, IN, United States*

9-9 MICROFLUIDICS 2018—FLUID ENGINEERING IN MICRO- AND NANOSYSTEMS

9-9-3 Fundamentals and Applications of Microfluidics

Third Floor, David L. Lawrence Convention Center, Room 324
3:45pm–5:30pm

Session Chair: Nazmul Islam, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chair: Jacek Wrobel, *Poltechresearch.com, Great Falls, VA, United States*

3:45pm – Transition From Planar Stratified Flow in Converging Microchannels

Technical Paper Publication. IMECE2018-86289

Zachary Lamberty, Minseo Park, Nelson Macken, *Swarthmore College, Swarthmore, PA, United States*, Adam Melvin, *Louisiana State University, Baton Rouge, LA, United States*

4:06pm – Experimental Study of the Suspension Flow Past Confined Low-Aspect-Ratio Cylinder Arranged Microchannels

Technical Paper Publication. IMECE2018-86980

Xiao Cheng, Zhenhai Pan, Huiying Wu, *Shanghai Jiao Tong University, Shanghai, China*

4:27pm – Degradation of Hydrophobic Surface Coatings Under Water Exposure

Technical Paper Publication. IMECE2018-87860

Matthew Trapuzzano, Rasim Guldiken, Andres Tejada-Martinez, Nathan Crane, *University of South Florida, T FL, United States*

4:48pm – A Quick and Easy Fabrication Method for Microfluidics Using Solid Ink Printing

Technical Presentation. IMECE2018-89139

Sara Hopper, *Endicott College, Beverly, MA, United States*,
Haipeng Zhang, Sangjin Ryu, *University of Nebraska–Lincoln, Lincoln, NE, United States*

5:09pm – Micropattern-Controlled Wicking Enhancement in Hierarchical Micro-/Nanostructures

Technical Presentation. IMECE2018-89192

Arif Rokoni, Dong-Ook Kim, Ying Sun, *Drexel University, Philadelphia, PA, United States*

9-11 14th FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW

9-11-2 Experimental Characterization of Complex Multiphase Flows

Third Floor, David L. Lawrence Convention Center, Room 325
3:45pm–5:30pm

Session Chair: Marianne Francois, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Session Co-Chair: Mark R Duignan, *Savannah River National Laboratory, Aiken, SC, United States*

3:45pm – Parametric Study and Improvement of Phase Separation in Intermediate Headers of Microchannel Condensers

Technical Paper Publication. IMECE2018-88438

Jun Li, Pega Hrnjak, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

4:06pm – Experimental Study of Chamber Volume Effect on Bubble Formation From Orifice Plates Submerged in Water

Technical Paper Publication. IMECE2018-87652

Omkar Gokhale, Milind Jog, Raj M. Manglik, *University of Cincinnati, Cincinnati, OH, United States*

4:27pm – Using Experimental Fluid Dynamics and Computational Dynamics for Evaluating Periodic Mixing

Technical Paper Publication. IMECE2018-88531

Judith Bamberger, Leonard Pease, Kurtis Recknagle, Carl Enderlin, Michael Minette, *Pacific Northwest National Laboratory, Richland, WA, United States*

4:48pm – Experimental Analysis of Two Phase Flow in a Quasi-Homogeneous Porous Inclined Hele-Shaw Cell

Technical Presentation. IMECE2018-88633

Luis Luviano-Ortiz, *University of Guanajuato, Salamanca/Guanajuato, Guanajuato, Mexico*, Gustavo Guerrero-Arellano, *University of Guanajuato, Santa Cruz de Juventino Rosas, Guanajuato, Mexico*, Nubia Sanchez, *University of Guanajuato, Salamanca, Guanajuato, Mexico*, Eduardo Ramos, *Universidad Nacional Autónoma de México, Temixco, Morelos, Mexico*, Abel Hernandez-Guerrero, *University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico*

5:09pm – Understanding Transport of Microgels Through a Constrictive Channel

Technical Presentation. IMECE2018-89990

Shuaijun Li, Florian Crepin, Alimohammad Anbari, Jing Fan, *City College of New York, New York, NY, United States*

WEDNESDAY, NOVEMBER 14

9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS

9-5-4 CFD Applications for Flow Optimization and Control – IV

Third Floor, David L. Lawrence Convention Center, Room 326
10:00am–11:45am

Session Chair: Zhongquan Charlie Zheng, *University of Kansas, Lawrence, KS, United States*

Session Co-Chairs: Ning Zhang, *McNeese State University, Lake Charles, LA, United States*, Philipp Epple, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

10:00am – Numerical Analysis of Breakwaters Turbulence Under Coastal Wave Actions

Technical Paper Publication. IMECE2018-88613

Huanrong Ouyang, Joshua Hantz, Tam Nguyen, *McNeese State University, Lake Charles, LA, United States*, **Amy Harrington,** *McNeese State University, Winnie, TX, United States*, **Ning Zhang,** *McNeese State University, Lake Charles, LA, United States*

10:21am – New Design Method for Spiral Casings Considering the Properties of the Impeller and Spiral Casing at Design and Off-Design Conditions and Numerical Verification With CFD

Technical Paper Publication. IMECE2018-88673

Philipp Epple, Manuel Fritsche, Michael Steppert, Michael Steber, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

10:42am – The Impact of the Gas Temperature and of the Relative Humidity on the Performance of Fans Operating in Drying Plants

Technical Paper Publication. IMECE2018-88674

Manuel Fritsche, Philipp Epple, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*, **Antonio Delgado,** *Friedrich-Alexander University of Erlangen-Nuernberg, Erlangen, Germany*

11:03am – Numerical Investigation to the Influence of Upstream Components on the Pressure Fluctuation in Draft Tube of Francis Turbine

Technical Presentation. IMECE2018-88818

Wen-Tao Su, *Harbin Institute of Technology, Harbin, Heilongjiang, China*, **You-Ning Xu,** *Shenyang Institute of Engineering, Shenyang, Liaoning, China*

9-11 14th FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW

9-11-3 Simulation of Multiphase Flows in Pumps and Complex Systems

Third Floor, David L. Lawrence Convention Center, Room 327
10:00am–11:45am

Session Chair: Robert Kunz, *Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: Joseph Katz, *Johns Hopkins University, Baltimore, MD, United States*

10:00am – Large Eddy Simulation of Ventilated Pump-Turbine for Wastewater Treatment

Technical Paper Publication. IMECE2018-86330

Cosan Daskiran, Bashar Attiya, Muhannad Altimemy, I-Han Liu, Alparslan Oztekin, *Lehigh University, Bethlehem, PA, United States*

10:21am – A Reduced-Order Model for Predicting the Performance of a Liquid-Ring Vacuum Pump

Technical Paper Publication. IMECE2018-86710

Irsha Pardeshi, Ashutosh Pandey, Tom Shih, *Purdue University, West Lafayette, IN, United States*

10:42am – Effect of Particle Parameters on Erosion Wear and Performance of Screw Centrifugal Pump

Technical Paper Publication. IMECE2018-88586

Zhengjing Shen, Wuli Chu, *Northwestern Polytechnical University, Xi'an, China*

11:03am – Numerical and Experimental Investigation of the Manufacturing Process of Ball Bearings Focusing on Enhancing the Aesthetics of the Outer Surface

Technical Presentation. IMECE2018-89614

Abdullah Alsairafi, Stefan Moldovan, *Youngstown State University, Youngstown, OH, United States*

9-13 27th SYMPOSIUM ON INDUSTRIAL FLOWS

9-13-1 Industrial Flows – I

Third Floor, David L. Lawrence Convention Center, Room 321
10:00am–11:45am

Session Chair: Alexandrina Untaroiu, *Virginia Tech, Blacksburg, VA, United States*

Session Co-Chairs: George Chamoun, *Eastman Kodak, Gray, TN, United States*, Kevin Anderson, *California State Polytech University, Pomona, CA, United States*

10:00am – Full Scale Testing of Pulse Jet Mixer Operating Control

Technical Paper Publication. IMECE2018-87866

Leolein Moualeu, Aaron Wand, Klemme Herman, Michaela Trinidad, Bethany Springer, Michael Hall, *Bechtel National Inc., Richland, WA, United States*, **Nathan McAdams,** *Bechtel National Inc., Reston, VA, United States*, **Langdon Holton,** *U.S. Department of Ener*

10:42am – Numerical Investigations of a Rotating Wire-Wrapped Cylinder

Technical Paper Publication. IMECE2018-86672

Assma Begum, Komal Gada, Hamid Rahai, *California State University-Long Beach, Long Beach, CA, United States*

11:03am – The Effect of PTFE Membrane Properties on Vacuum Membrane Distillation Module Performance

Technical Paper Publication. IMECE2018-86327

Mustafa Usta, Robert M. Krysko, Ali E. Anqi, Ahmed M. Alshwairakh, Alparslan Oztekin, *Lehigh University, Bethlehem, PA, United States*

11:24am – Assessment of Different Turbulence Models on Simulations of Confined Jets in a Crossflow at Supercritical Pressure

Technical Paper Publication. IMECE2018-87894

Saeid Janani, Komal Gada, Hamid Rahai, *California State University-Long Beach, Long Beach, CA, United States*, Farhad Davoudzadeh, *Air Force Research Laboratory, Lancaster, CA, United States*

9-8 KIRTI (KARMAN) GHIA CELEBRATION OF LIFE SYMPOSIUM

9-8-1 Kirti Ghia Celebration of Life – I

Third Floor, David L. Lawrence Convention Center, Room 326
1:45pm–3:30pm

Session Chair: Surya Vanka, *University of Illinois, Champaign, IL, United States*

Session Co-Chair: S.A. Sherif, *University of Florida, Gainesville, FL, United States*

1:45pm – Flow in Driven Cavities: Building on Karman Ghia's Legacy

Technical Presentation. IMECE2018-89029

Surya Vanka, *University of Illinois, Champaign, IL, United States*

2:06pm – In Memory of Prof. Kirti Ghia: A Tribute to Life-Long Learning and Evolution

Technical Presentation. IMECE2018-90010

Ameer G., *Department of Homeland Security, Arlington, VA, United States*

2:27pm – LOW-Emission Combustion Research at NASA Glenn

Technical Presentation. IMECE2018-89025

Dhanireddy Reddy, *NASA Glenn Research Center, Cleveland, OH, United States*

2:48pm – GlennICE: A Next Generation Computational Ice Accretion Solver

Technical Presentation. IMECE2018-89142

Christopher Porter, *NASA Glenn Research Center, Cleveland, OH, United States*

9-11 14th FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW

9-11-4 Modeling of Slug Flows, Separators, and Shocks

Third Floor, David L. Lawrence Convention Center, Room 327
1:45pm–3:30pm

Session Chair: Mark R. Duignan, *Savannah River National Laboratory, Aiken, SC, United States*

Session Co-Chair: Robert Kunz, *Pennsylvania State University, University Park, PA, United States*

1:45pm – The Investigation of the Kinetic Energy of Slug in a Horizontal Channel Using VOF Method

Technical Paper Publication. IMECE2018-87108

Nariman Ashrafi, *IAU, Tehran, Iran*, Mohammad Reza Ansari, *Tarbiat Modares University, Tehran, Iran*, Armin Chegini, Ali Sadeghi, *SRBIAU, Tehran, Iran*

2:06pm – Analysis of Two-Phase Flow Slug Regime With Engineering Approach

Technical Paper Publication. IMECE2018-87118

Nariman Ashrafi, *IAU, Tehran, Iran*, Armin Chegini, Ali Sadeghi, *SRBIAU, Tehran, Iran*

2:27pm – Mechanistic Modeling of Dynamic Zero-Net Liquid Holdup (ZNLH) in Gas-Liquid Cylindrical Cyclone (GLCC©) Separator

Technical Paper Publication. IMECE2018-88481

Srinivas Swaroop Kolla, Megharaj Praneeth Karpurapu, Ram Mohan, Ovadia Shoham, *University of Tulsa, Tulsa, OK, United States*

2:48pm – On the Aspects of a Convergent Shock Wave Impinging a Perturbed Density Interface

Technical Paper Publication. IMECE2018-88098

Erik Proano, Bertrand Rollin, Dongeun Seo, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

9-13 27th SYMPOSIUM ON INDUSTRIAL FLOWS

9-13-2 Industrial Flows – II

Third Floor, David L. Lawrence Convention Center, Room 321
1:45pm–3:30pm

Session Chair: Kevin Anderson, *California State Polytech University, Pomona, CA, United States*

Session Co-Chairs: Alexandrina Untaroiu, *Virginia Tech, Blacksburg, VA, United States*, Ivaylo Nedyalkov, *University of New Hampshire, Durham, NH, United States*

1:45pm – Pressure Fluctuation Mitigation in a Francis Turbine With Water Injection: Computational Study

Technical Paper Publication. IMECE2018-86333

Muhannad Altimemy, Cosan Daskiran, Bashar Attiya, I-Han Liu, Alparslan Oztekin, *Lehigh University, PA, United States*

2:06pm – Development of the Pneumatic Non-Contact Holder

Technical Paper Publication. IMECE2018-86618
Tetsuhiro Tsukiji, *Sophia University, Tokyo, Japan*, **Ryosuke Kondo**, *Sophia University, Tokorozawa-shi, Saitama, Japan*

2:27pm – Experimental Characterization of Particle-Laden Air Flow Across Horizontal Pipe Junctions

Technical Paper Publication. IMECE2018-87833
Tariq Khan, Mohamed Alshehhi, *The Petroleum Institute, Abu Dhabi, Abu Dhabi, United Arab Emir.*, **Xu Rumin**, *Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.*, **Saqib Salam**, *The Petroleum Institute, Abu Dhabi, Abu Dhabi, United Arab Emir*

2:48pm – Numerical Analysis on the Hydraulic Performance of the Auxiliary Impeller in Large Capacity Canned-Motor Pump

Technical Paper Publication. IMECE2018-87285
Shengde Wang, Zhenqiang Yao, Hong Shen, Guohu Luo, *Shanghai Jiao Tong University, Shanghai, China*

3:09pm – An Assessment of Health Hazards in Valves for Gaseous Oxygen Service: Sources and Preventive Measures

Technical Paper Publication. IMECE2018-86018
Anil Kumar, *Independent Author, Pune, India*, **Younus Sheikh**, *Army Institute of Technology, Savitribai Phule Pune University, Pune, India*

9-6 PANEL: CFD/EFD CHOICE? — A DILEMMA FOR INDUSTRIES**9-6-1 Computational or Experimental Fluid Dynamics?—A Dilemma for Industries**

Third Floor, David L. Lawrence Convention Center, Room 327
3:45pm–5:30pm

Session Chair: Philipp Epple, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

Session Co-Chair: Emma Frosina, *University of Naples, Naples, Italy*

3:45pm – CFD and EFD in the Design Process of Fans and Blowers

Panel Presentation. IMECE2018-88829
Philipp Epple, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

4:06pm – How Do You Know It's Accurate? An Insider's Guide to CFD Validation and Verification

Panel Presentation. IMECE2018-88844
William Kulp, *ANSYS, Canonsburg, PA, United States*

4:27pm – Prediction of Both Aeration and Cavitation in Axial Piston Pumps Using a 3D-CFD Numerical Approach

Panel Presentation. IMECE2018-88969
Emma Frosina, *University of Naples, Naples, Italy*

4:48pm – Evaluating Periodic Mixing With Experimental and Computational Fluid Dynamics

Panel Presentation. IMECE2018-89407
Judith Bamberger, *Pacific Northwest National Laboratory, Richland, WA, United States*

9-8 KIRTI (KARMAN) GHIA CELEBRATION OF LIFE SYMPOSIUM**9-8-2 Kirti Ghia Celebration of Life – II**

Third Floor, David L. Lawrence Convention Center, Room 326
3:45pm–5:30pm

Session Chair: Surya Vanka, *University of Illinois, Champaign, IL, United States*

Session Co-Chair: Mark R. Duignan, *Savannah River National Laboratory, Aiken, SC, United States*

3:45pm – CFD for the Development of Bio-Inspired Unmanned Vehicles

Technical Presentation. IMECE2018-88982
Ravi Ramamurti, Jason Geder, *Naval Research Laboratory, Washington, DC, United States*

4:06pm – Flow and Heat Transfer Past Turbine Airfoils

Technical Presentation. IMECE2018-89591
Sumanta Acharya, Yousef Kanani, *Illinois Institute of Technology, Chicago, IL, United States*

4:27pm – Multiphase Boundary Layer Models for Aircraft Icing Simulation

Technical Presentation. IMECE2018-89605
Alric Rothmayer, *Iowa State University, Ames, IA, United States*

4:48pm – Automated Hybrid Volume Mesh Generation With Adaptive Surface/Volume Refinement

Technical Presentation. IMECE2018-89624
John Steinbrenner, Steve Karman, Jr., Nick Wyman, *Pointwise, Inc., Fort Worth, TX, United States*

5:09pm – Utilization of The StreamVane for Boundary Layer Ingestion Testing

Technical Presentation. IMECE2018-89753
Mark Celestina, Julia Stephens, *NASA Glenn Research Center, Cleveland, OH, United States*

9-13 27th SYMPOSIUM ON INDUSTRIAL FLOWS

9-13-3 Industrial Flows – III

Third Floor, David L. Lawrence Convention Center, Room 321
3:45pm–5:30pm

Session Chair: George Chamoun, *Eastman Kodak, Gray, TN, United States*

Session Co-Chairs: Kevin Anderson, *California State Polytech University, Pomona, CA, United States*, Nikhil Kumar Palakurthi, *University of Cincinnati, Cincinnati, OH, United States*

3:45pm – Analyzing the Flow in Annular Gap With a Restrictor Mounted on Outer Cylinder

Technical Paper Publication. IMECE2018-87207
Guohu Luo, Zhenqiang Yao, Hong Shen, Shengde Wang, *Shanghai Jiao Tong University, Shanghai, China*

4:06pm – Bench Scale Experimental Study of Slug Flow Phenomena Using PID Control

Technical Paper Publication. IMECE2018-88564
Derek Staal, Daniel Schmidt, Jeffery McClung, Mark Behl, Mayank Tyagi, *Louisiana State University, Baton Rouge, LA, United States*

4:27pm – Pilot Scale Experimental Study of Slug Flow Phenomena Using PID Control

Technical Paper Publication. IMECE2018-88565
Daniel Schmidt, Jeffery McClung, Mark Behl, Derek Staal, Mayank Tyagi, *Louisiana State University, Baton Rouge, LA, United States*

4:48pm – Numerical Simulation and Analysis of Heat Recovery for Multi-Stage Air Compressors

Technical Presentation. IMECE2018-89705
Yiming Ma, Yi Chu, *FS-Elliott CN Co., Shanghai, China*, Rongxin Zhang, Brad Hayes, *FS-Elliott LLC, Export, PA, United States*, Xuyang Chi, *FS-Elliott CN Co., Shanghai, Shanghai, China*

THURSDAY, NOVEMBER 15

9-12 4th FORUM ON MULTIPHASE FLOW WITH BIO-APPLICATIONS

9-12-1 Multiphase Flow With Bio-Applications

Third Floor, David L. Lawrence Convention Center, Room 318
8:55am–10:40am

Session Chair: Ning Zhang, *McNeese State University, Lake Charles, LA, United States*

8:55am – Multiphase Fluid Flow Modeling for Biomedical Application (Shirodhara)

Technical Presentation. IMECE2018-87432
Swathika M., *Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*, B.T. Kannan, *Independent Trainer/Consultant, Chennai, Tamil Nadu, India*, L. Sugumar, *Sukra Helitek Pvt. Ltd., Chennai, Tamil Nadu, India*, Lakshmana Rao C., *Balasubramanian Venkatesh, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*

9:16am – Modelling of the Transport of Salinity and Organic Matters in Sabine Lake

Technical Presentation. IMECE2018-89896
Ning Zhang, *McNeese State University, Lake Charles, LA, United States*

9:37am – Interaction and Coalescence on a Pair of Laser-Induced Bubbles

Technical Presentation. IMECE2018-89903
Yiwei Wang, Hongchen Li, Jingzhu Wang, *Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

9-14 SYMPOSIUM ON WIND TURBINES AERODYNAMICS AND CONTROL

9-14-1 Symposium on Wind Turbines Aerodynamics and Control

Third Floor, David L. Lawrence Convention Center, Room 319
8:55am–10:40am

Session Chair: Majid Rashidi, *Cleveland State University, Pepper Pike, OH, United States*

8:55am – Aerodynamic Shape Optimization of Diffuser Augmented Wind Turbine Shrouds Using Asynchronous Differential Evolution

Technical Paper Publication. IMECE2018-86820
Stavros Leloudas, Georgios Lygidakis, Giorgos Strofylas, Ioannis Nikolos, *Technical University of Crete, Chania, Greece*

9:16am – The Impact of the Wind Power Plant on the Air Radar's Functioning

Technical Paper Publication. IMECE2018-86823
Victorita Radulescu, *University Politehnica of Bucharest, Bucharest, Romania*

9:37am – Genetic Algorithm-Based Design of Airfoil for the Root Region of Small Wind Turbines and Performance Analysis With Gurney Flaps

Technical Paper Publication. IMECE2018-87327
Mohammed Rafiuddin Ahmed, Krishnil R. Ram, *University of the South Pacific, Suva, Fiji*, **Bum-Suk Kim**, *Jeju National University, Jeju, Korea (Republic)*, **Sunil P. Lal**, *Massey University, Palmerston, New Zealand*

9:58am – Numerical Simulation on Aerodynamic Performance of Ram Air Turbine Based on Mixed Flow Field

Technical Paper Publication. IMECE2018-88304
Xiangbo Zhang, Shuiting Ding, Fenzhu Ji, Farong Du, *Beihang University, Beijing, China*, **Shengrong Guo**, *Nanjing Engineer Institute of Aircraft System Jincheng, Nanjing, China*

9-15 18th INTERNATIONAL SYMPOSIUM ON MEASUREMENT AND MODELING OF ENVIRONMENTAL FLOWS

9-15-1 18th International Symposium on Measurement and Modeling of Environmental Flows
Third Floor, David L. Lawrence Convention Center, Room 323
8:55am–10:40am

Session Chair: S.A. Sherif, *University of Florida, Gainesville, FL, United States*

Session Co-Chair: Kashif Nawaz, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

8:55am – PittPack: Open-Source FFT-Based Poisson's Equation Solver for Computing With Accelerators

Technical Paper Publication. IMECE2018-87697
Jaber Javanshir Hasbestan, *University of Pittsburgh, East Ridge, TN, United States*, **Inanc Senocak**, *University of Pittsburgh, Pittsburgh, PA, United States*

9:16am – Front Dynamics in Miscible Displacement Flow in a Curved Pipe

Technical Paper Publication. IMECE2018-88449
Mohammadreza Yavari, Majid Bazargan, *Khaje Nassir Toosi University of Technology, Tehran, Iran*, **Elaheh Bagherizadeh**, *Stony Brook University, Stony Brook, NY, United States*

9:37am – Effect of Wind Speed on Ventilation Flow Through a Two Dimensional Room Fitted With a Windcatcher

Technical Paper Publication. IMECE2018-88666
Rahil Taghipour, Peter Abdo, *University of Technology Sydney, Sydney, Australia*, **B. Phuoc Huynh**, *University of Technology Sydney, Broadway NSW, Australia*

9:58am – Large Eddy Simulation of Turbulent Freestream/Bed Interactions With Coupled Surface/Subsurface Momentum Balance

Technical Presentation. IMECE2018-89196
Y. P. Lian, J. D. Dallmann, B. H. Sonin, K. R. Roche, A. I. Packman, Gregory Wagner, *Northwestern University, Evanston, IL, United States*

10:19am – Interference of Straight and Tapered Cylinder Pairs Near the First Critical Speed

Technical Presentation. IMECE2018-89883
Rishav Rishav, Srinivas V. Veeravalli, *Indian Institute of Technology Delhi, Delhi, Delhi, India*, **Suhail Ahmad**, *Indian Institute of Technology Delhi, Hauz Khas, New Delhi, Delhi, India*

9-4 24th SYMPOSIUM ON FUNDAMENTAL ISSUES AND PERSPECTIVES IN FLUID MECHANICS

9-4-1 Fundamentals and Basic Research

Third Floor, David L. Lawrence Convention Center, Room 318
10:50am–12:35pm

Session Chair: John Buchanan, *UNNPP, Pittsburgh, PA, United States*

Session Co-Chair: Wayne Strasser, *Eastman Chemical Co., Kingsport, TN, United States*

10:50am – Extracting Substantial Free Energy From Static Ambient Potential Energy Using Distance, Time-Lapse Chaos, and Coriolis Principles

Technical Paper Publication. IMECE2018-86128
Jim Surjaatmadja, *Halliburton, Duncan, OK, United States*

11:11am – Liquid Sloshing in a Partially-Filled Enclosure due to Sudden Impact or Periodic Motion

Technical Presentation. IMECE2018-86724
Bakhtier Farouk, *Drexel University, Philadelphia, PA, United States*

11:32am – The Reynolds Stress in Turbulence From an Alternate Perspective

Technical Paper Publication. IMECE2018-86870
Taewoo Lee, *Arizona State University, Tempe, AZ, United States*

11:53am – Force Decomposition of Medium Reynolds Number Oscillating Flow Over a Submerged Sphere

Technical Paper Publication. IMECE2018-88187
Aibek Bekkulov, *University of Texas Rio Grande Valley, Edinburg, TX, United States*, **Shehua Huang**, *Wuhan University, Wuhan, Hubei, China*, **Ben Xu**, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

12:14pm – Effect of Slip Length on Drag Reduction and Delayed Transition in Laminar Channel Flow

Technical Presentation. IMECE2018-89179
Ethan Davis, Jae Sung Park, *University of Nebraska–Lincoln, Lincoln, NE, United States*

9-16 11th FORUM ON FLUID MEASUREMENTS AND INSTRUMENTATION

9-16-1 Fluid Measurements and Instrumentation – I
Third Floor, David L. Lawrence Convention Center, Room 319
10:50am–12:35pm

Session Chair: Stamatios Pothos, *TSI Incorporated, Shoreview, MN, United States*

10:50am – Digital Processors' Algorithms Used in Laser Based Pointwise Measurement Techniques

Technical Presentation. IMECE2018-86837
Stamatios Pothos, Daniel Troolin, *TSI Incorporated, Shoreview, MN, United States*

11:11am – Effect of Passive Green Wall Modules on Air Temperature and Humidity

Technical Paper Publication. IMECE2018-86963
Peter Abdo, *University of Technology Sydney, Sydney, Australia*, **B. Phuoc Huynh,** *University of Technology Sydney, Broadway NSW, Australia*

11:32am – Volumetric Velocity and Sizing Using Imaging in Two Phase Flows

Technical Presentation. IMECE2018-87831
Daniel Troolin, Aaron Boomsma, Stamatios Pothos, *TSI Incorporated, Shoreview, MN, United States*

11:53am – Stereoscopic Particle Shadow Velocimetry

Technical Paper Publication. IMECE2018-88013
Jeff Harris, Christine Truong, *Pennsylvania State University, State College, PA, United States*, **Michael McPhail,** *Mayo Clinic, Phoenix, AZ, United States*, **Arnie Fontaine,** *Pennsylvania State University, State College, PA, United States*

12:14pm – Settling Characteristics of Polymeric Additives in Dodecane

Technical Paper Publication. IMECE2018-88555
Gurjap Singh, Stephen Pitts, *University of Iowa, Iowa City, IA, United States*, **Elio Lopes,** *Santa Catarina State University, Joinville, Santa Catarina, Brazil*, **Albert Ratner,** *University of Iowa, Iowa City, IA, United States*

9-2 16th SYMPOSIUM ON ELECTRIC, MAGNETIC AND THERMAL PHENOMENA IN MICRO- AND NANO-SCALE SYSTEMS

9-2-1 Electric, Magnetic & Thermal Phenomena
Third Floor, David L. Lawrence Convention Center, Room 317
2:05pm–3:50pm

Session Chair: Dennis A. Siginer, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

Session Co-Chair: Boris Khusid, *New Jersey Institute of Technology, Newark, NJ, United States*

2:05pm – Characterizing Microfluidic Operations Underlying an Electrowetting Heat Pipe on the International Space Station

Technical Paper Publication. IMECE2018-86223
Enakshi Wikramanayake, Renee Hale, John Elam, Arjang Shahriari, Vaibhav Bahadur, *University of Texas at Austin, Austin, TX, United States*, **Angel R. Alvarez-Hernandez, Nathan Howard,** *NASA Johnson Space Center, Houston, TX, United States*

2:26pm – Dielectrophoretic Control of a Droplet at the Interface of Two Liquids in a Three Liquid System

Technical Paper Publication. IMECE2018-86487
Manojkumar Lokanathan, Enakshi Wikramanayake, Vaibhav Bahadur, Roger Bonnacaze, *University of Texas at Austin, Austin, TX, United States*

2:47pm – Enhancement in Gas Pumping to Generate Corona Wind by an EHD Gas Pump

Technical Presentation. IMECE2018-86958
A.K.M. Monayem Mazumder, *Saginaw Valley State University, Saginaw, MI, United States*

3:08pm – Electric Field Control of Propulsion Force of Chemically Driven Marangoni Locomotor

Technical Presentation. IMECE2018-87233
Shigeki Tsuchitani, Takumi Ikebe, Hirofumi Miki, Kunitomo Kikuchi, *Wakayama University, Wakayama, Japan*

9-4 24th SYMPOSIUM ON FUNDAMENTAL ISSUES AND PERSPECTIVES IN FLUID MECHANICS

9-4-2 Computational Methods in Fluid Mechanics

Third Floor, David L. Lawrence Convention Center, Room 318
2:05pm–3:50pm

Session Chair: Taewoo Lee, *Arizona State University, Tempe, AZ, United States*

Session Co-Chair: Wayne Strasser, *Eastman Chemical Co., Kingsport, TN, United States*

2:05pm – A Central Difference Finite Volume Lattice Boltzmann Method for Simulation of 2D Inviscid Compressible Flows on Triangular Meshes

Technical Paper Publication. IMECE2018-86302
Alireza Karbalaei, *University of Central Florida, Orlando, FL, United States*, **Kazem Hejranfar**, *Sharif University of Technology, Tehran, Tehran, Iran*

2:26pm – Finite Element Models of One-Dimensional Flows With Node-Dependent Accuracy

Technical Paper Publication. IMECE2018-86852
Daniele Guarnera, **Enrico Zappino**, **Alfonso Pagani**, **Erasmus Carrera**, *Politecnico di Torino, Torino, Italy*

2:47pm – Characterization of Model-Based Uncertainties in Incompressible Turbulent Flows by Machine Learning

Technical Paper Publication. IMECE2018-87178
Mustafa Usta, *Lehigh University, Bethlehem, PA, United States*, **Ali Tosyali**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

3:08pm – Computational Investigation of Flow Over Geometry Compliant Lattice Structures

Technical Paper Publication. IMECE2018-87846
James Tinsley, *Honeywell FM&T, Kansas City, MO, United States*, **Kelly Homan**, *Missouri University of Science & Technology, Rolla, MO, United States*, **Gregory Vernon**, *Honeywell FM&T, Kansas City, MO, United States*

3:29pm – Bridging Method of Turbulence for High Reynolds Number Separated Flows Past Bluff Bodies

Technical Presentation. IMECE2018-89693
Sagar Saroha, **Sawan S. Sinha**, *Indian Institute of Technology Delhi, Delhi, Delhi, India*, **Sunil Lakshmipathy**, *Gexcon AS, Bergen, Norway*

9-16 11th FORUM ON FLUID MEASUREMENTS AND INSTRUMENTATION

9-16-2 Fluid Measurements and Instrumentation – II

Third Floor, David L. Lawrence Convention Center, Room 319
2:05pm–3:50pm

Session Chair: Ivaylo Nedyalkov, *University of New Hampshire, Durham, NH, United States*

2:05pm – Practical Considerations for Simultaneous LDV and PIV Measurements

Technical Presentation. IMECE2018-86841
Stamatios Pothos, **Daniel Troolin**, **Aaron Boomsma**, *TSI Incorporated, Shoreview, MN, United States*

2:26pm – An Experimental Setup to Characterize Boundary Layer Asymmetry on a Spinning Projectile Using Magnetic Resonance Velocimetry

Technical Paper Publication. IMECE2018-87472
Kevin Sullivan, *U.S. Military Academy, Avon Lake, OH, United States*, **Aaron P. Schlenker**, *U.S. Military Academy, Lenhartsville, PA, United States*, **Noah W. Siegel**, *U.S. Military Academy, Las Vegas, NV, United States*, **Isaiah Valdez**, *U.S. Military Academy, Aztec, NM, United States*, **Bret Van Poppel**, **Michael Benson**, *U.S. Military Academy, West Point, NY, United States*, **Gregory Rodebaugh**, *Armament Research Development and Engineering Center, Picatinny, NJ, United States*, **Christopher Elkins**, *Stanford University, Palo Alto, CA, United States*, **Chase Snow**, *U.S. Army, West Point, NY, United States*

2:47pm – Weep Hole and Interlayer Gap Flow Within Layered Pressure Vessels

Technical Paper Publication. IMECE2018-87948
Cameron Coates, **Timothy Chastain**, *Georgia Southern University, Savannah, GA, United States*

3:08pm – CFD Analysis of Vortex Shedding of an Isolated Rolling Tire

Technical Presentation. IMECE2018-88443
Navid Goudarzi, *UNCC, Charlotte, NC, United States*

3:29pm – Optical Measurement Techniques to Development Cardiovascular Devices

Technical Presentation. IMECE2018-88630
Keefe Manning, *Pennsylvania State University, University Park, PA, United States*

9-4 24th SYMPOSIUM ON FUNDAMENTAL ISSUES AND PERSPECTIVES IN FLUID MECHANICS

9-4-3 Fundamental Fluids Engineering and Applications

Third Floor, David L. Lawrence Convention Center, Room 318
4:00pm–5:45pm

Session Chair: John Buchanan, *UNNPP, Pittsburgh, PA, United States*

Session Co-Chair: Wayne Strasser, Eastman Chemical Co., Kingsport, TN, United States

4:00pm – The Effect of Delta Winglet Inclination Angle on the Vortical Flow Downstream

Technical Paper Publication. IMECE2018-86331

Junguo Wang, David Ting, *University of Windsor, Windsor, ON, Canada*, **Steve Ray**, *Essex Energy, Oldcastle, ON, Canada*

4:21pm – Numerical Investigation of Velocity Coefficient for Organic Turbine Nozzles Using MM as Working Fluid

Technical Paper Publication. IMECE2018-87212

Laihe Zhuang, Guoqiang Xu, Jie Wen, Benshi Dong, *Beihang University, Beijing, China*

4:42pm – Analyzing the Shear Heating Effects in Modeling the Hydrodynamic Lubrication of High Torque Low Speed Diesel Engine by Considering Different Viscosity-Grade Lubricants

Technical Paper Publication. IMECE2018-88238

Saqib Naseer, *NUST College of Electrical and Mechanical Engineering, Rawalpindi, Pakistan*, **Syed Adnan Qasim**, *NUTECH School of Engineering & Technologies, Islamabad, Punjab, Pakistan*, **Raja Amer Azim**, *NUST College of E&ME, Rawalpindi, Punjab, Pakistan*, **Kishwat Ijaz Malik**, *University of Wah, Wah Cant, Punjab, Pakistan*

5:03pm – Performance Evaluation of Coefficient of Performance of Variable Refrigerants Using Vapour Compression Refrigeration System Model

Technical Presentation. IMECE2018-88774

Cyril Okorowo, *Institute of Management and Technology, Enugu, Enugu, Nigeria*, **Okechukwu T. Onah**, *Enugu State University of Science and Technology, Enugu, Enugu, Nigeria*

5:24pm – Organized Motion of Turbulent Flow at Low Reynolds Number in a Square Duct

Technical Presentation. IMECE2018-89560

Hamid Hassan Khan, *Indian Institute of Technology Delhi, New Delhi, India*, **Syed Fahad Anwer, Nadeem Hasan**, *Aligarh Muslim University, Aligarh, Uttar Pradesh, India*, **Sanjeev Sanghi**, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

TRACK 10 HEAT TRANSFER AND THERMAL ENGINEERING

- 10-1-1: Analysis of Thermal Systems
- 10-3-1: K6-2 Numerical Analysis and Performance Assessment of Energy Systems
- 10-4-1: System Analysis
- 10-4-2: Component/Material Design and Analysis
- 10-6-1: Batteries
- 10-6-2: Capacitors
- 10-7-1: Analysis of Radiative Transfer in Energy Systems
- 10-7-2: Radiative Properties
- 10-8-1: Heat Transfer in Passive Thermal Control Systems
- 10-10-1: K6-9 Two Phase Transport in Energy Systems and Non-Equilibrium and Dynamic Energy Systems
- 10-11-1: K6-10 Panel on the Key Role of Heat Transfer Analysis and Methodology in Research
- 10-13-1: Measurements of Thermophysical Properties
- 10-14-1: Calculations of Thermophysical Properties 1
- 10-14-2: Calculations of Thermophysical Properties 2
- 10-15-1: Fundamentals of Boiling and Evaporation
- 10-15-2: K8-1 Fundamentals of Boiling
- 10-15-3: K8-1 Fundamentals of Boiling, Evaporation, and Condensation
- 10-16-1: K8-2 Fundamentals of Single Phase Convection
- 10-17-1: Fundamentals of Multi-Scale Modeling
- 10-18-1: K8-4 Fundamentals of Liquid/Solid Phase Change (Icing/Deicing, Solidification)
- 10-20-1: Panel on Fundamentals of Non-Equilibrium Transport
- 10-21-1: K9-1 Thermal Transport across Hard/Soft Interfaces – I
- 10-21-2: K9-1 Thermal Transport across Hard/Soft Interfaces – II
- 10-21-3: K9-1 Thermal Transport across Hard/Soft Interfaces – III
- 10-22-1: K9-2 Coupled Thermal Transport by Electrons, Magnons, and Phonons
- 10-23-1: K9-3 Phononic Crystals and Thermoelectrics – I
- 10-23-2: K9-3 Phononic Crystals and Thermoelectrics – II
- 10-25-1: K9-5 Micro/Nanoscale Phase Change Heat Transfer – I
- 10-25-2: K9-5 Micro/Nanoscale Phase Change Heat Transfer – II
- 10-26-1: Measurement of Near-Field Thermal Radiation
- 10-26-2: Theoretical Prediction of Thermal Emission and Energy Conversion
- 10-26-3: Radiative Properties and Radiative Transfer in the Far Field
- 10-27-1: Thermal Metrology for Nanoscale Heat Transfer
- 10-28-1: K9-8 Advances in Simulation Methods
- 10-29-1: Heat Conduction in 2D Materials/Devices
- 10-29-2: Heat Transfer Devices and Engineering
- 10-29-3: Transport at Interfaces
- 10-29-4: Thermal Conductivity
- 10-29-5: Thermal Engineering with Plasmonic Materials
- 10-29-7: Micro-/Nanoelectronics and Related Issues
- 10-30-1: Single-Phase Enhanced Heat Transfer – Numerical Studies – II
- 10-30-2: Single-Phase Enhanced Heat Transfer – Numerical Studies – I
- 10-30-3: Single-Phase Enhanced Heat Transfer – Numerical Studies – III
- 10-32-1: CMS – Combustion Power System
- 10-33-1: CMS – Sprays and Emissions
- 10-34-1: CMS – Applied Combustion – Modeling Heat Transfer and Combustion
- 10-34-2: CMS – Applied Combustion – Improving System Performance
- 10-36-1: K13-1 Heat Transfer in Multiphase Systems – I
- 10-36-2: K13-1 Heat Transfer in Multiphase Systems – II
- 10-36-3: K13-1 Heat Transfer in Multiphase Systems – III
- 10-39-1: Gas Turbine Heat Transfer and Cooling
- 10-40-1: K15-1 Transport Phenomena in Manufacturing and Materials Processing – I
- 10-40-2: K15-1 Transport Phenomena in Manufacturing and Materials Processing – II
- 10-42-1: K16-1: Heat Transfer in Electronic Equipment – I
- 10-42-2: K16-1: Heat Transfer in Electronic Equipment – II
- 10-44-1: Thermal Transport under Microscale and Rotating Features
- 10-44-2: Thermal Transport Understanding and Its Applications
- 10-47-1: Heat Transfer and Heat Exchange
- 10-50-1: Heat Transfer in HVAC Systems and Air Quality and Comfort in Confined Spaces
- 10-51-1: Thermal Management of Electronic Equipment
- 10-53-1: Applications of Computational Heat Transfer: Convection
- 10-53-2: Applications of Computational Heat Transfer: Industrial Applications
- 10-54-1: Methods in Computational Heat Transfer
- 10-55-1: Heat Transfer and Fluid Flow Roundtable: Navigating the Code Landscape
- 10-55-2: Heat Transfer and Fluid Flow Roundtable: Navigating the Code Landscape
- 10-56-1: Panel on Recent Advances in Heat Transfer Education
- 10-59-1: Heat and Mass Transport Photogallery
- 10-60-1: Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – I
- 10-60-2: Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – II
- 10-60-3: Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – III
- 10-61-1: K8-7 Fundamentals of Boiling and Condensation – II-B
- 10-61-2: K8-7 Fundamentals of Condensation, Transient Boiling, and Dehumidification
- 10-62-1: Single-Phase Enhanced Heat Transfer – Applications
- 10-63-1: Multi-Phase and Passive Enhanced Heat Transfer
- 10-63-2: Multi-Phase and Passive Enhanced Heat Transfer
- 10-64-1: Heat Transfer and Thermal Engineering Plenary I
- 10-64-2: Heat Transfer and Thermal Engineering Plenary II

ACKNOWLEDGMENT

Track Organizers

John Maulbetsch, *Maulbetsch Consulting, United States*
 Kevin Dowding, *Sandia National Laboratories, United States*
 Peiwen Li, *University of Arizona, United States*

Topic Organizers

Mitra Sexton, *Knolls Atomic Power Lab, United States*
 Matthew Schifano, *Naval Nuclear Laboratory, United States*
 Alexander Rattner, *The Pennsylvania State University, United States*
 Hohyun Lee, *Santa Clara University, United States*
 Leitao Chen, *Rice University, United States*
 Laura Schaefer, *Rice University, United States*
 Matthew R. Jones, *Brigham Young University, United States*
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 Nesrin Ozalp, *University of Minnesota Duluth, United States*
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 Xianming Bai, *Virginia Tech, United States*
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 Navdeep Singh Dhillon, *California State University Long Beach, United States*
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 Alan McGaughey, *Carnegie Mellon University, United States*
 Patrick Oosthuizen, *Queen's University, Canada*
 Chris Kobus, *Oakland University, United States*
 Oronzio Manca, *Università degli Studi della Campania, Italy*
 Amitabh Narain, *Michigan Tech University, United States*
 Nicholas Roberts, *Utah State University, United States*
 Vaibhav Bahadur, *University of Texas at Austin, United States*
 Yan Wang, *University of Nevada, Reno, United States*
 Xiulin Ruan, *Purdue University, United States*
 Liping Wang, *Arizona State University, United States*
 Sanjiv Sinha, *University of Illinois, United States*
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 Albert Ratner, *University of Iowa, United States*
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 Mohsen Ghamari, *Wilkes University, United States*
 Kris Jorgensen, *A. O. Smith, Brookfield, WI, United States*
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 Columbia Mishra, *Intel Corporation, United States*
 Shima Hajimirza, *Texas A&M University, United States*
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 Amanie Abdelmessih, *California Baptist University, United States*
 Mark Kedzierski, *NIST, United States*
 A. G. Agwu Nnanna, *University of Texas of the Permian Basin, United States*
 Ahmed Elatar, *Oak Ridge National Laboratory, United States*

Session Organizers

Mitra Sexton, *Knolls Atomic Power Lab, United States*
 Leitao Chen, *Rice University, United States*
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 Amanie Abdelmessih, *California Baptist University, United States*
 Ahmed Elatar, *Oak Ridge National Laboratory, United States*

TRACK 10 HEAT TRANSFER AND THERMAL ENGINEERING

MONDAY, NOVEMBER 12

10-3 K6-2 NUMERICAL ANALYSIS AND PERFORMANCE ASSESSMENT OF ENERGY SYSTEMS

10-3-1 K6-2 Numerical Analysis and Performance Assessment of Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 323
9:45am–11:30am

Session Chair: Mitra Sexton, *Knolls Atomic Power Lab, Clifton Park, NY, United States*

9:45am – Numerical Simulation of Convection and Heat Transfer in Unsteady Transverse Tube Banks

Technical Paper Publication. IMECE2018-86897

Ling ling, Wenjie Wang, Mo Yang, *University of Shanghai for Science and Technology, Shanghai, China*

10:06am – Forced Convection Enhancement in a Square Channel by an EHD Gas Pump

Technical Presentation. IMECE2018-86961

A.K.M. Monayem Mazumder, *Saginaw Valley State University, Saginaw, MI, United States*

10:27am – Numerical Investigation on Simultaneous Effects of Surface Roughness and Variable Properties on Laminar Flow in Annular Tubes

Technical Paper Publication. IMECE2018-88288

Morteza Heydari, Amirhossein Bagheri, Hamid Sadat, Huseyin Bostanci, Seifollah Nasrazadani, *University of North Texas, Denton, TX, United States*

10:48am – Accelerating Evaluation of Converged Lattice Thermal Conductivity

Technical Presentation. IMECE2018-89007

Guangzhao Qin, Ming Hu, *University of South Carolina, Columbia, SC, United States*

11:09am – The Adiabatic Analysis on Rotary Displacer Stirling Engine

Technical Paper Publication. IMECE2018-87758

Amirhossein Bagheri, William C. Mullins, Phillip R. Foster, Huseyin Bostanci, *University of North Texas, Denton, TX, United States*

10-4 K6-3 HEAT TRANSFER ANALYSIS IN WASTE HEAT RECOVERY SYSTEMS

10-4-2 Component/Material Design and Analysis

Third Floor, David L. Lawrence Convention Center, Room 327
9:45am–11:30am

Session Chair: Hohyun Lee, *Santa Clara University, Santa Clara, CA, United States*

9:45am – Studies on the Hard Chrome Plating in Reciprocating Air Compressors

Technical Paper Publication. IMECE2018-86532

Aadhithiyam Amutha Kulasekaran, *National Institute of Technology, Sundergarh, Odisha, India*, Anbarasu Subramanian, *National Institute of Technology, Rourkela, Rourkela, Odisha, India*

10:06am – Experimental Investigation of Heat Pipe Heat Exchanger (HPHE) for Waste Heat Recovery Application

Technical Presentation. IMECE2018-88031

Md. Farhan Shakil, A.K.M.M. Morshed, *Bangladesh University of Engineering & Technology, Dhaka, Bangladesh*, Azzam Salman, *University of South Carolina, West Columbia, SC, United States*, Titan Paul, *University of South Carolina Aiken, Aiken, SC, United States*

10:27am – Thermomechanical Reliability in Thermoelectric Power Generators Consisting of Low Thermal Conductivity Materials

Technical Presentation. IMECE2018-86606

Hee Seok Kim, *University of South Alabama, Mobile, AL, United States*

10:48am – Thermal and Phonon Transport Analysis in 2D Materials Systems With Record-High Efficiency for Waste Heat Recovery

Technical Presentation. IMECE2018-86053

Joon Sang Kang, Man Li, Yongjie Hu, *University of California, Los Angeles, Los Angeles, CA, United States*

10-21 K9-1 THERMAL TRANSPORT ACROSS HARD/SOFT INTERFACES

10-21-1 K9-1 Thermal Transport Across Hard/Soft Interfaces – I

Third Floor, David L. Lawrence Convention Center, Room 325
9:45am–11:30am

Session Chair: Xiulin Ruan, *Purdue University, West Lafayette, IN, United States*

Session Co-Chair: Sangyeop Lee, *University of Pittsburgh, Pittsburgh, PA, United States*

9:45am – Achieving Huge Thermal Conductance of Metallic Nitride on Graphene Through Enhanced Elastic and Inelastic Phonon Transmission

Technical Presentation. IMECE2018-89402

Weidong Zheng, Bin Huang, Hongkun Li, Yee Kan Koh, *National University of Singapore* ngapor

10:06am – Nonequilibrium Landauer Approach for Thermal Interfaces

Technical Presentation. IMECE2018-89938

Jingjing Shi, Xiaolong Yang, *Purdue University, West Lafayette, IN, United States*, Timothy Fisher, *University of California, Los Angeles, Los Angeles, CA, United States*, Xiulin Ruan, *Purdue University, West Lafayette, IN, United States*

10:27am – Fullerene-Based Superatomic Crystals? Thermal Transport Controlled by Orientation Disorder

Technical Presentation. IMECE2018-87762

Matthew Bartnof, Alexander D. Christodoulides, *Carnegie Mellon University, Pittsburgh, PA, United States*, Wee-Liat Ong, *ZJU-UIUC, Zhejiang University, Haining, Zhejiang Province, China*, Evan O'Brien, Xavier Roy, *Columbia University, New York, NY, United States*, Alan McGaughey, Jonathan Malen, *Carnegie Mellon University, Pittsburgh, PA, United States*

10:48am – Strain Effect on Thermal Transport in Carbon Nanotube-Graphene Junctions

Technical Paper Publication. IMECE2018-87764

Jungkyu Park, Paul Pena, *Kennesaw State University, Marietta, GA, United States*

11:09am – Implication of 1D-2D van der Waals Heterostructures for Pressure Sensors

Technical Presentation. IMECE2018-89083

Yuan Gao, Baoxing Xu, *University of Virginia, Charlottesville, VA, United States*

10-51 K20-1 THERMAL MANAGEMENT OF ELECTRONIC EQUIPMENT

10-51-1 Thermal Management of Electronic Equipment

Fourth Floor, David L. Lawrence Convention Center, Room 404
9:45am–11:30am

Session Chair: Columbia Mishra, *Intel Corporation, Hillsboro, OR, United States*

Session Co-Chairs: Vaibhav Bahadur, *University of Texas at Austin, Austin, TX, United States*, Shima Hajimirza, *Texas A&M University, College Station, TX, United States*

9:45am – Design and Testing of Liquid Cooled Thermal Solution for High Loading (Socket P) Processors

Technical Paper Publication. IMECE2018-86730

Anali Soto, Veronica Torreblanca, *Intel, Zapopan, Jalisco, Mexico*, Devdatta Kulkarni, *Intel, Hillsboro, OR, United States*

10:06am – Spray Cooling-Based Thermal Management of Extreme Power Densities Using Orthotropic Composite Heat Spreaders

Technical Presentation. IMECE2018-87708

Huseyin Bostanci, Sai S. Obuladinne, *University of North Texas, Denton, TX, United States*

10:27am – Raising Inlet Air Temperature for a Hybrid-Cooled Server Retrofitted With Liquid Cooled Cold Plates

Technical Paper Publication. IMECE2018-88497

Uschas Chowdhury, Ashwin Siddarth, Manasa Sahini, Dereje Agonafer, *University of Texas at Arlington, Arlington, TX, United States*

10:48am – Feasibility Study of Effective Cooling Through Microchannel Heat Sink (MCHS) and Nanofluid Applications

Technical Paper Publication. IMECE2018-88690

Darryl Jennings, Jr., Sonya Smith, *Howard University, Washington, DC, United States*

11:09am – Wake Vortex Regimes in Airflows Generated by Piezoelectric Fans and Their Effect on the Mean Air Jet

Technical Presentation. IMECE2018-89181

Navid Dehdari Ebrahimi, Y. Sungtaek Ju, *University of California, Los Angeles, Los Angeles, CA, United States*

10-59 K22-1 HEAT AND MASS TRANSPORT PHOTOGALLERY

10-59-1 Heat and Mass Transport Photogallery

Third Floor, David L. Lawrence Convention Center, Room 326
9:45am–11:30am

Session Chair: Shreyas Chavan, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chair: Muhammad Jahidul Hoque, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Coalescence-Induced Droplet Jumping on Superhydrophobic Nanostructured, Superhydrophobic Hierarchical, and Biphilic Hierarchical Surfaces

Poster Presentation. IMECE2018-86903

Xiao Yan, Soumyadip Sett, Lezhou Feng, Leicheng Zhang, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Zhiyong Huang, Feng Chen, *Tsinghua University, Beijing, Beijing, China*, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Dynamic Defrosting on Superhydrophobic and Bi-Philic Surfaces

Poster Presentation. IMECE2018-86943

Shreyas Chavan, Kalyan Boyina, Kirk Fortelka, Maury Lira, Peter Sokalski, Deokgeun Park, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Water Vapor Condensation on Bi-Conductive Surfaces

Poster Presentation. IMECE2018-87081

Moonkyung Kim, Xiao Yan, Sean Ebihara, Irene Andsgaer, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Flow Visualization of Microscale Effusion and Transpiration Cooling on Semi-Cylinder for Gas Turbine Cooling Application

Technical Presentation. IMECE2018-87257

Dong Hwan Shin, Seongsik Moon, Jin Sub Kim, Do Won Kang, Jeong Lak Sohn, Jungho Lee, *Korea Institute of Machinery & Materials, Deajeon, Korea (Republic)*

Visualization of Two-phase Bursting Flow inside the Entire Thermosyphon at Different Filling Ratios

Technical Presentation. IMECE2018-87269

Yeonghwan Kim, Dong Hwan Shin, Jin Sub Kim, *Korea Institute of Machinery & Materials, Deajeon, Korea (Republic)*, Seung M. You, *The University of Texas at Dallas, Richardson, TX, United States*, Jungho Lee, *Korea Institute of Machinery & Materials, Deajeon, Korea (Republic)*

Dropwise Condensation of Ethanol on Lubricant-Infused Surfaces

Poster Presentation. IMECE2018-87283

Soumyadip Sett, Longnan Li, Kalyan Boyina, Peter Sokalski, Xiao Yan, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Visualization Study on Hydrodynamics and Material Deformation of Zirconium Wire by Transient Pool Boiling

Poster Presentation. IMECE2018-87287

Jun-young Kang, SeungHyun Hong, Byong-Guk Jeon, Yong Seok Choi, Seok Cho, Jong-Kuk Park, Sang-Ki Moon, *Korea Atomic Energy Research Institute, Daejeon, Korea (Republic)*

Cicada-Inspired Self-Cleaning Superhydrophobic Surfaces

Poster Presentation. IMECE2018-87924

Junho Oh, Sabrina Yin, Shreyas Chavan, Catherine Dana, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Sungmin Hong, Jessica Roman, Kyoo Jo, Donald M. Cropek, *Army Construction Engineering Research Laboratory, Champaign, IL, United States*, Marianne Alleyne, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Visualization of Droplet Nucleation on Patterned Hybrid Surfaces

Poster Presentation. IMECE2018-88092

Muhammad Jahidul Hoque, Seok Kim, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Visualizing Confined Boiling of Self-Assembled Liquid Bridges for Electronics Cooling

Technical Presentation. IMECE2018-88922

Thomas Foulkes, Shreyas Chavan, Junho Oh, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Robert Pilawa, *University of California, Berkeley, Berkeley, CA, United States*, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10-60 PROF. FRANK KREITH MEMORIAL SYMPOSIUM: ADVANCES IN HEAT TRANSFER, ENERGY SYSTEMS & SUSTAINABILITY

10-60-1 Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – I

Third Floor, David L. Lawrence Convention Center, Room 324
9:45am–11:30am

Session Chair: Raj M. Manglik, *University of Cincinnati, Cincinnati, OH, United States*

Session Co-Chairs: Satwindar Sadhal, *University of Southern California, Los Angeles, CA, United States*, John Maulbetsch, *Maulbetsch Consulting, Menlo Park, CA, United States*

9:45am – Sunrise Delayed but the Sun Shines Brightly: The Legacy of Professor Frank Kreith

Technical Presentation. IMECE2018-86304

Raj M. Manglik, *University of Cincinnati, Cincinnati, OH, United States*

10:06am – Thirst for Power: Energy, Water and Human Survival

Technical Presentation. IMECE2018-86320

Michael E. Webber, *University of Texas at Austin, Austin, TX, United States*

10:27am – Multi-Scale Modeling of Power Plant Performance Enhancement Using Asynchronous Thermal Storage and Heat Rejection

Technical Paper Publication. IMECE2018-88107

Lauren B. Gagnon, Dre Helmns, Van P. Carey, *University of California, Berkeley, Berkeley, CA, United States*

10:48am – How Long is the Lull? Supply and Demand Responses to Wind and Solar Variability

Technical Presentation. IMECE2018-89623

Robert Socolow, *Princeton University, Princeton, NJ, United States*

11:09am – Bringing Solar Hot Water to a Navajo School in Breadsprings, New Mexico Using CPC Stationary Concentrators

Technical Presentation. IMECE2018-90055

Joseph J. O’Gallagher, *Alternative Energy Solutions, Flossmoor, IL, United States*, Roland Winston, *University of California, Merced, Merced, CA, United States*

10-4 K6-3 HEAT TRANSFER ANALYSIS IN WASTE HEAT RECOVERY SYSTEMS

10-4-1 System Analysis

Third Floor, David L. Lawrence Convention Center, Room 323
1:45pm–3:30pm

Session Chair: Alexander Rattner, *Pennsylvania State University, University Park, PA, United States*

1:45pm – Thermodynamic Analysis and Multi-Objective Optimizations of a Combined Recompression sCO₂ Brayton Cycle: tCO₂ Rankine Cycles for Waste Heat Recovery

Technical Paper Publication. IMECE2018-86844
Ali Alsagri, *University of Dayton, Beavercreek, OH, United States*, **Andrew Chiasson**, **Ahmad A. Aljabr**, *University of Dayton, Dayton, OH, United States*

2:06pm – Simple Analytic Model for Optimally Sizing Thermoelectric Generator Module Arrays

Technical Presentation. IMECE2018-87145
Alexander Rattner, *Pennsylvania State University, University Park, PA, United States*

2:27pm – Efficiency Improvement in Small Internal Combustion Engine Using Exhaust Heat Recovery System

Technical Paper Publication. IMECE2018-87565
Shashank Rai, **Selin Arslan**, *Lawrence Technological University, Southfield, MI, United States*, **Badih Jawad**, *Lawrence Technological University, Dearborn Heights, MI, United States*

2:48pm – Uniquely Designed Solar Tube in a Natural/Forced Mini-Water Heating System

Technical Paper Publication. IMECE2018-86896
Amanie Abdelmessih, *California Baptist University, Diamond Bar, CA, United States*, **Siddiq/S.S. Mohammed**, *California Baptist University, Riverside, CA, United States*

3:09pm – Performance Prediction Modeling of a Full-Scale Electrostatic Precipitator

Technical Presentation. IMECE2018-89748
Abu Nayem Md. Asraf Siddiquee, *Arkansas State University, Jonesboro, AR, United States*, **Kwangkook Jeong**, *Arkansas State University, State University, AR, United States*, **Shinku Lee**, **Eungchul Lee**, *Doosan Heavy Industries & Construction Co. Ltd., Gyeongnam, Korea (Republic)*

10-20 K8-6 PANEL ON FUNDAMENTALS OF NON-EQUILIBRIUM TRANSPORT (JOINT WITH K9)

10-20-1 Panel on Fundamentals of Non-Equilibrium Transport

Third Floor, David L. Lawrence Convention Center, Room 326
1:45pm–3:30pm

Session Chair: Yan Wang, *University of Nevada, Reno, Reno, NV, United States*

Session Co-Chair: Xiulin Ruan, *Purdue University, West Lafayette, IN, United States*

1:45pm – Non-Equilibrium Transport in Two-Dimensional Materials

Panel Presentation. IMECE2018-90005
Xianfan Xu, *Purdue University, West Lafayette, IN, United States*

2:06pm – Optical Generation and Detection of Non-Equilibrium Phonons and Magnons

Panel Presentation. IMECE2018-90032
Li Shi, *University of Texas, Austin, TX, United States*

2:27pm – Role of Ballistic Electron Transport and Electron-Injection on thermal Conductance Across Metal/Non-Metal Interfaces

Panel Presentation. IMECE2018-90063
Patrick E. Hopkins, *University of Virginia, Charlottesville, VA, United States*

2:48pm – A Multi-Temperature Model for Non-Equilibrium Thermal Transport

Panel Presentation. IMECE2018-90058
Xiulin Ruan, *Purdue University, West Lafayette, IN, United States*

10-21 K9-1 THERMAL TRANSPORT ACROSS HARD/SOFT INTERFACES

10-21-2 K9-1 Thermal Transport Across Hard/Soft Interfaces – II

Third Floor, David L. Lawrence Convention Center, Room 325
1:45pm–3:30pm

Session Chair: Bladimir Ramos, *Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: Hasan Babaei, *University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States*

1:45pm – Prediction of Spectral Contribution to Thermal Boundary Conductance Between Dissimilar Materials Exhibiting Extreme Interfacial Bond Strengths

Technical Presentation. IMECE2018-87554
James Moughamian, **William Yorgason**, **Nicholas Roberts**, *Utah State University, Logan, UT, United States*

2:06pm – Heat Transfer Across Crystalline and Amorphous Silicon Surfaces in Contact With Water and the Effects of the Interfacial Liquid Structuring

Technical Paper Publication. IMECE2018-86497

Luis E. Paniagua-Guerra, C. Ulises Gonzalez-Valle, Pennsylvania State University, State College, PA, United States, Bladimir Ramos, Pennsylvania State University, University Park, PA, United States

2:27pm – Interfacial Heat Transfer Between Erythritol and Xylitol Crystals as a Mixture Heat Storage Material

Technical Paper Publication. IMECE2018-87195

Biao Feng, Liwu Fan, Zhejiang University, Hangzhou, Zhejiang, China

2:48pm – Heat Transfer Across 3C-SiC-Water Interfaces: Solid-Liquid Affinity, Interfacial Structuring, and Spectral Characteristics

Technical Presentation. IMECE2018-88890

C. Ulises Gonzalez-Valle, Pennsylvania State University, State College, PA, United States, Bladimir Ramos, Pennsylvania State University, University Park, PA, United States

3:09pm – TX-100 Capped Iron Oxide Nanoparticle Transformation and Implications for Induction Heating and Hyperthermia Treatment

Technical Presentation. IMECE2018-87556

Hayden Carlton, David Huitink, University of Arkansas, Fayetteville, AR, United States

10-40 K15-1 TRANSPORT PHENOMENA IN MANUFACTURING AND MATERIALS PROCESSING

10-40-1 K15-1 Transport Phenomena in Manufacturing and Materials Processing – I

Third Floor, David L. Lawrence Convention Center, Room 327

1:45pm–3:30pm

Session Chair: Patrick Mensah, Southern University, Baton Rouge, LA, United States

Session Co-Chair: Stephen Akwaboa, Southern University and A&M College, Baton Rouge, LA, United States

1:45pm – Defects Evaluation of Selective Laser Melting Stainless Steel 316 Parts Using Positron Annihilation Lifetime Measurement

Technical Paper Publication. IMECE2018-86729

Hong Yao, Louisiana State University, Baton Rouge, LA, United States, Ryan Katona, University of Virginia, Charlottesville, VA, United States, Jianren Zhou, Louisiana State University, Baton Rouge, LA, United States, Md. Islam, Louisiana State University, Baton Rouge, LA, United States, Jonathan Raush, ULL, Lafayette, LA, United States, Fengyuan Lu, Shengmin Guo, Louisiana State University, Baton Rouge, LA, United States

2:06pm – Scale Up of Powder Flow and Heat Transfer in Rotary Kilns

Technical Presentation. IMECE2018-89951

Bereket Yohannes, Anna Nachtigal, William Borghard, Fernando Muzzio, Benjamin Glasser, Alberto Cuitino, Rutgers University, Piscataway, NJ, United States

2:27pm – Phase Evolution and Corrosion Performance of Laser Processed Oxide Dispersion Strengthened Ferritic Alloys

Technical Paper Publication. IMECE2018-86736

Ali Hemmasian Etefagh, Hao Wen, Fengyuan Lu, Shengmin Guo, Louisiana State University, Baton Rouge, LA, United States

2:48pm – Atomistic Modeling of Ga Doping of Crystalline Si by Focused Ion Beam

Technical Presentation. IMECE2018-89933

Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Zayd Leseman, Kansas State University, Manhattan, KS, United States

10-54 K20-4 METHODS IN COMPUTATIONAL HEAT TRANSFER

10-54-1 Methods in Computational Heat Transfer

Fourth Floor, David L. Lawrence Convention Center, Room 404

1:45pm–3:30pm

Session Chair: Cheng-xian Lin, Florida International University, Miami, FL, United States

Session Co-Chair: Xiuling Wang, Purdue University Northwest, Hammond, IN, United States

1:45pm – Effects of Vacancy Cluster Defects on Phonon Transport of the Phase Change Material GeTe Using a Neural Network Interatomic Potential

Technical Presentation. IMECE2018-89390

Ruiqiang Guo, Sangyeop Lee, University of Pittsburgh, Pittsburgh, PA, United States

2:06pm – A Transient Approach to Determine Heat Source Strength and Location in a Wall Plume

Technical Presentation. IMECE2018-89809

Ardeshir Bangian Tabrizi, Rutgers University, New Brunswick, NJ, United States, Yogesh Jaluria, Rutgers University, Piscataway, NJ, United States

2:27pm – Applying a Radiative Heat Transfer Finite-Volume Methodology to a Geometrically Complex Furnace

Technical Paper Publication. IMECE2018-86831

Georgios Lygidakis, Stavros Leloudas, Ioannis Nikolos, Technical University of Crete, Chania, Greece

2:48pm – An Integrated Method of FVM and SPH for Treating Melting Process of Quartz Ingots

Technical Paper Publication. IMECE2018-86113

Zhongyi Liu, Jing Wang, Qianli Ma, Haisheng Fang, Huazhong University of Science & T China

3:09pm – Heat Transfer Enhancement in Wavy Micro-Channels Through Multiharmonic Surfaces

Technical Paper Publication. IMECE2018-86425

Justin Moon, *California State University, Los Angeles, Los Angeles, CA, United States*, **J. Rafael Pacheco**, *SAP America Inc., Tempe, AZ, United States*, **Arturo Pacheco-Vega**, *California State University, Los Angeles, Los Angeles, CA, United States*

10-60 PROF. FRANK KREITH MEMORIAL SYMPOSIUM: ADVANCES IN HEAT TRANSFER, ENERGY SYSTEMS & SUSTAINABILITY

10-60-2 Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – II

**Third Floor, David L. Lawrence Convention Center, Room 324
1:45pm–3:30pm**

Session Chair: Satwindar Sadhal, *University of Southern California, Los Angeles, CA, United States*

Session Co-Chairs: John Maulbetsch, *Maulbetsch Consulting, Menlo Park, CA, United States*, Raj M. Manglik, *University of Cincinnati, Cincinnati, OH, United States*

1:45pm – Recent Advances in Thermal Energy Storage Using Phase Change Materials

Technical Presentation. IMECE2018-88900

D. Yogi Goswami, *University of South Florida, Tampa, FL, United States*

2:06pm – Experimental and Economic Evaluation of Some Promising Flat Plate Solar Collectors

Technical Presentation. IMECE2018-88779

Noam Lior, *University of Pennsylvania, Philadelphia, PA, United States*

2:27pm – Future Scenarios for Emissions From Energy and Power Production in the Rocky Mountain Region

Technical Paper Publication. IMECE2018-87614

Rene Nsanzineza, Jana Milford, *University of Colorado Boulder, Boulder, CO, United States*

2:48pm – Near Term Prospects for Solar Syngas and Hydrogen

Technical Presentation. IMECE2018-89758

Jane Davidson, *University of Minnesota, Wayzata, MN, United States*

3:09pm – Forced Convection in High Porosity Metal Foams in a Square Duct in Presence of an Array of Impinging Jets

Technical Presentation. IMECE2018-88939

Roop Mahajan, *Virginia Tech, Blacksburg, VA, United States*, **Prashant Singh**, *North Carolina State University, Raleigh, NC, United States*

10-6 K6-5 THERMAL MANAGEMENT OF BATTERY SYSTEMS

10-6-1 Batteries

**Third Floor, David L. Lawrence Convention Center, Room 325
3:45pm–5:30pm**

Session Chair: Leita Chen, *Rice University, Houston, TX, United States*

Session Co-Chair: Laura Schaefer, *Rice University, Houston, TX, United States*

3:45pm – In Situ Characterization of the Thermal, Ionic, and Mechanical Behaviors of Lithium Ion Batteries for Advanced Thermal Management

Technical Presentation. IMECE2018-86049

Yongjie Hu, Joon Sang Kang, Ming Ke, *University of California, Los Angeles, Los Angeles, CA, United States*

4:06pm – 3D-Printed PCM/HDPE Composites for Battery Thermal Management

Technical Paper Publication. IMECE2018-86081

Thomas Freeman, *Embry-Riddle Aeronautical University, Carthage, NC, United States*, **Kaloki Nabutola, David Spitzer, Patrick Currier, Sandra Boetcher**, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

4:27pm – A Comprehensive Parametric Study of Minichannel Based Liquid Cooling of Li-Ion Battery Pack

Technical Paper Publication. IMECE2018-87923

Zhoujian An, Krishna Shah, *University of California, Merced, CA, United States*, **Yanbao Ma**, *University of California, Merced, Merced, CA, United States*, **Jia Li**, *Beijing Jiaotong University, Beijing, China*

4:48pm – Development of a Nine-Cell Hybrid Heat Sink for Thermal Management of Hot-Spots – Concentrated Photovoltaic Applications

Technical Presentation. IMECE2018-88839

Ibrahim Hassan, Ahmad Almomani, Danish Rahman, Aziz Rahman, *Texas A&M University at Qatar, Doha, Qatar*, **Yasser Al Hamidi**, *Texas A&M University, College Station, TX, United States*

10-8 K6-7 HEAT TRANSFER IN PASSIVE THERMAL CONTROL SYSTEMS

10-8-1 Heat Transfer in Passive Thermal Control Systems

Third Floor, David L. Lawrence Convention Center, Room 327
3:45pm–5:30pm

Session Chair: Rydge Mulford, *Brigham Young University, Provo, UT, United States*

3:45pm – A 1-kW Day-and-Night Radiative Cooling System for Cold Water Generation

Technical Presentation. IMECE2018-88495

Ablimit Aili, Dongliang Zhao, Yao Zhai, Jiatao Lu, Dillon Kidd, Nicolas Seitz, Alexander Savage, *University of Colorado Boulder, Boulder, CO, United States, Gang Tan,* *University of Wyoming, Laramie, WY, United States, Xiaobo Yin, Ronggui Yang,* *University of Colorado Boulder, Boulder, CO, United States*

4:06pm – Dynamic Temperature Control via Actuation of a Deployable/Retractable Radiator

Technical Presentation. IMECE2018-88891

Rydge Mulford, Lance Hyatt, Samuel Salt, Ernest Lee, *Brigham Young University, Provo, UT, United States, Vivek Dwivedi,* *NASA Goddard, Greenbelt, MD, United States, Matthew R. Jones, Brian D. Iverson,* *Brigham Young University, Provo, UT, United States*

4:27pm – Sub-Ambient Passive Daytime Radiative Cooling Using a Directional Approach

Technical Presentation. IMECE2018-89481

Bikram Bhatia, Arny Leroy, Yichen Shen, Lin Zhao, Melissa Gianello, Duanhui Li, Tian Gu, Juejun Hu, Marin Soljatic, Evelyn Wang, *Massachusetts Institute of Technology, Cambridge, MA, United States*

4:48pm – The Solid-State Electrocaloric Refrigeration With Unimorph Beam and Its Analytical Model

Technical Paper Publication. IMECE2018-88634

Zhimin Sun, Qing-Ming Wang, William Slaughter, *University of Pittsburgh, Pittsburgh, PA, United States*

5:09pm – Device-Level Thermodynamic Model for an Electrocaloric Cooler

Technical Presentation. IMECE2018-86433

Jie Gong, Alan McGaughey, *Carnegie Mellon University, Pittsburgh, PA, United States*

10-22 K9-2 COUPLED THERMAL TRANSPORT BY ELECTRONS, MAGNONS, AND PHONONS

10-22-1 K9-2 Coupled Thermal Transport by Electrons, Magnons, and Phonons

Third Floor, David L. Lawrence Convention Center, Room 326
3:45pm–5:30pm

Session Chair: Tengfei Luo, *University of Notre Dame, Notre Dame, IN, United States*

Session Co-Chair: Ruiqiang Guo, *Caltech, Pasadena, CA, United States*

3:45pm – Crystalline Polymer Nanofibers With Ultra-High Thermal Conductivity and Strength

Invited Presentation. IMECE2018-89242

Sheng Shen, *Carnegie Mellon University, Pittsburgh, PA, United States*

4:27pm – Magnon and Phonon Dispersion, Lifetime and Thermal Conductivity of Iron From Spin-Lattice Dynamics Simulations

Technical Presentation. IMECE2018-86297

Xufei Wu, Zeyu Liu, Tengfei Luo, *University of Notre Dame, Notre Dame, IN, United States*

4:48pm – Atomistic Simulations of Phononic and Magnonic Thermal Transport in Magnetic Materials

Technical Presentation. IMECE2018-88860

Yanguang Zhou, *University of California, Los Angeles, Los Angeles, CA, United States, Julien Tranchdia,* *Sandia National Laboratories, Albuquerque, NM, United States, Yijun Ge, Timothy S. Fisher, Jayathi Murthy,* *University of California, Los Angeles, Los Angeles, CA, United States*

5:09pm – Tuning Electronic Heat Transport in Graphene/Metal Heterostructures With Ultralow Thermal Conductivity

Technical Presentation. IMECE2018-89400

Bin Huang, Weidong Zheng, Yee Kan Koh, *National University of Singapore, Singapore, Singapore*

10-32 K11-1 CMS—COMBUSTION POWER SYSTEMS

10-32-1 CMS—Combustion Power System

Third Floor, David L. Lawrence Convention Center, Room 323
3:45pm–5:30pm

Session Chair: Omid Askari, *Mississippi State University, Mississippi State, MS, United States*

3:45pm – An Integrated Design for a Portable Methanol Fuel Microcombustion-Thermoelectric Coupled Power Device

Technical Presentation. IMECE2018-88186

Bhanu Prakash Reddy Guggilla, Alexander Rusted, Bruce Barrett, Ryan Moran, Navroop Kaur, Smitesh Bakrania, *Rowan University,*

4:06pm – Automated Engine Calibration Optimization Using Online Extremum Seeking

Technical Paper Publication. IMECE2018-87911
Ripudaman Singh, Andrew Mansfield, Margaret Wooldridge, *University of Michigan, Ann Arbor, MI, United States*

4:27pm – Characteristics of a Non-Premixed Rotating Detonation Combustor Using Natural Gas-Hydrogen Blend at Elevated Air-Preheat Temperature and Backpressure

Technical Paper Publication. IMECE2018-88569
Arnab Roy, Donald Ferguson, Todd Sidwell, Peter Strakey, *National Energy Technology Laboratory, Morgantown, WV, United States*

4:48pm – Micro Combustor Development Using Hydrogen as Fuel

Technical Paper Publication. IMECE2018-88659
Ronak Shah, ADIT, Anand, Gujarat, India, Digvijay Kulshreshtha, Nisarg Chaudhari, C K Pithawala College of Engineering and Technology, Surat, Gujarat, India

5:09pm – Performance and Emissions Analysis of Partially Pre-Mixed Charge Compression Ignition Combustion

Technical Paper Publication. IMECE2018-86410
Charu V. Srivatsa, Jonathan Mattson, Christopher Depcik, *University of Kansas, Lawrence, KS, United States*

10-42 K16-1: HEAT TRANSFER IN ELECTRONIC EQUIPMENT

10-42-1 K16-1: Heat Transfer in Electronic Equipment – I

Fourth Floor, David L. Lawrence Convention Center, Room 404
3:45pm–5:30pm

Session Chair: Seungbae Park, *Binghamton University, Binghamton, NY, United States*

Session Co-Chair: Hendrik PJ De Bock, *GE Global Research, Schenectady, NY, United States*

3:45pm – Two-Wavelength Thermoreflectance and Its Application in Temperature Measurement of Micro-Electronic Devices

Technical Paper Publication. IMECE2018-87989
Hongjie Zhang, Sy-Bor Wen, *Texas A&M University, College Station, TX, United States*

4:06pm – Experimental Evaluation of a Dual Taper Manifold in a Thermosiphon Loop for Data Center Application

Technical Presentation. IMECE2018-88799
Aranya Chauhan, Satish Kandlikar, *Rochester Institute of Technology, Rochester, NY, United States*

4:27pm – Heat Transfer Analysis of a High Capacity Thermal Battery

Technical Presentation. IMECE2018-89187
Mun Goung Jeong, *KAIST, Daejeon, Korea (Republic)*, Jang-Hyeon Cho, *Agency for Defense Development, Daejeon, Korea (Republic)*, Bong Jae Lee, *KAIST, Daejeon, Korea (Republic)*

4:48pm – Temperature Measurement of M.2 NVMe Solid State Drive Using Infrared Thermometry

Technical Presentation. IMECE2018-89153
Eung Chang Lee, Jinsung Rho, *KAIST, Daejeon, Korea (Republic)*, Heeyoub Kang, *Samsung Electronics, Suwon, Korea (Republic)*, Bong Jae Lee, *KAIST, Daejeon, Korea (Republic)*

5:09pm – Constructal Design Development in China

Technical Presentation. IMECE2018-88892
Lingen Chen, *Naval University of Engineering, Wuhan, China*

10-60 PROF. FRANK KREITH MEMORIAL SYMPOSIUM: ADVANCES IN HEAT TRANSFER, ENERGY SYSTEMS & SUSTAINABILITY

10-60-3 Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability – III

Third Floor, David L. Lawrence Convention Center, Room 324
3:45pm–5:30pm

Session Chair: John Maulbetsch, *Maulbetsch Consulting, Menlo Park, CA, United States*

Session Co-Chairs: Satwindar Sadhal, *University of Southern California, Los Angeles, CA, United States*, Raj M. Manglik, *University of Cincinnati, Cincinnati, OH, United States*

3:45pm – Toward Optimal Operation of Thermal Systems

Technical Presentation. IMECE2018-88920
Yogesh Jaluria, *Rutgers University, Piscataway, NJ, United States*

4:06pm – Challenges in the Heat and Mass Transfer Aspects of Comfort Cooling: Separating Sensible and Latent Loads—Material Constraints and New Opportunities

Technical Presentation. IMECE2018-86719
William Worek, *Texas A&M University - Kingsville, Corpus Christi, TX, United States*

4:27pm – Interdisciplinary Network of Sustainable Engineering and Its Application to Built Environment

Technical Presentation. IMECE2018-88789
Cem Keskin, M. Pinar Menguc, *Ozyegin University, Istanbul, Turkey*

4:48pm – Improvements in Distributed Power Generation and Waste Heat Recovery (Including Data Center Cooling) Based on Significantly Reduced Air-Side Thermal Resistances and Enhanced Flow-Boiling

Technical Presentation. IMECE2018-86344
Amitabh Narain, *Michigan Tech University, Houghton, MI, United States*, Vibhu Vivek, *Vivek Technologies LLC, Santa Clara, CA, United States*, Hrishikesh Ranga Prasad, Nikhil Shinde, *Soroush Sepahyar, Michigan Technological University, Houghton, MI, United States*

5:09pm – Array Jet Impingement Onto High Porosity Thin Metal Foams at Zero Jet-to-Foam Spacing
Technical Paper Publication. IMECE2018-87915
Prashant Singh, *North Carolina State University, Raleigh, NC, United States*, Mingyang Zhang, Jaideep Pandit, Roop Mahajan, *Virginia Polytechnic Institute & State University, Blacksburg, VA, United States*

TUESDAY, NOVEMBER 13

10-64 HEAT TRANSFER AND THERMAL ENGINEERING PLENARIES

10-64-1 Heat Transfer and Thermal Engineering Plenary I

Third Floor, David L. Lawrence Convention Center, Room 306
8:00am–8:45am

8:00am – Multiscale Modeling of Nanoparticle Transport: Applications to Targeted Drug

Plenary Presentation. IMECE2018-90102
Portonovo Ayyaswamy, *University of Pennsylvania, Philadelphia, PA, United States*

10-64 HEAT TRANSFER AND THERMAL ENGINEERING PLENARIES

10-64-2 Heat Transfer and Thermal Engineering Plenary II

Third Floor, David L. Lawrence Convention Center, Room 306
9:00am–9:45am

9:00am – Aerospace Thermal Management: Challenges and Opportunities

Plenary Presentation. IMECE2018-90103
Andrew Bicos, *Boeing Co., Huntington Beach, CA, United States*

10-7 K6-6 RADIATIVE HEAT TRANSFER AND RADIATIVE PROPERTIES OF ENERGY SYSTEMS

10-7-1 Analysis of Radiative Transfer in Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 321
10:00am–11:45am

Session Chair: Matthew R. Jones, *Brigham Young University, Provo, UT, United States*

10:00am – Design and Evaluation of the Fresnel-Lens Based Solar Concentrator System Through a Statistical-Algorithmic Approach

Technical Paper Publication. IMECE2018-87023
Hassan Qandil, Weihuan Zhao, *University of North Texas, Denton, TX, United States*

10:21am – Non-Gray Radiation Exchange: The Internal Fractional Function Reconsidered

Technical Paper Publication. IMECE2018-86386
John Lienhard V, *Massachusetts Institute of Technology, Cambridge, MA, United States*

10:42am – Radiation Characterization of Packed Beds Using Artificial Neural Networks

Technical Presentation. IMECE2018-89013
Hynn Hee Kang, Shima Hajimirza, *College Station, TX, United States*

11:03am – Orthogonal Function Extension to the Hottel Zone Method

Technical Presentation. IMECE2018-88771
 Daniel Wanegar, Ofodike Ezekoye, *University of Texas, Austin, TX, United States*

11:24am – Uncertainty in Optical Particulate Counters

Technical Presentation. IMECE2018-87781
 Jared Blanchard, Jacob Thomas, Nicholas J. Wallace, Connan Wu, Randy S. Lewis, Matthew R. Jones, *Brigham Young University, Provo, UT, United States*

10-15 K8-1 FUNDAMENTALS OF BOILING AND CONDENSATION – I

10-15-1 Fundamentals of Boiling and Evaporation
 Third Floor, David L. Lawrence Convention Center, Room 320
 10:00am–11:45am

Session Chair: Vijay Dhir, *University of California, Los Angeles, Los Angeles, CA, United States*

Session Co-Chairs: Diana-Andra Borca-Tasciuc, *Rensselaer Polytech Institute, Troy, NY, United States*, C. Thomas Avedisian, *Cornell University, Ithaca, NY, United States*

10:00am – Mechanism Interaction During Droplet Evaporation on Nanostructured Hydrophilic Surfaces

Technical Paper Publication. IMECE2018-87991
 Van P. Carey, *University of California, Berkeley, CA, United States*, Claire K. Wemp, *University of California, San Jose, CA, United States*, Emma R. McClure, Samuel Cabrera, *University of California, Berkeley, CA, United States*

10:21am – Nanoscale Wetting and Energy Transmission at Solid-Liquid Interfaces

Technical Presentation. IMECE2018-89801
 John A. Tomko, Ashutosh Giri, David Olson, John Gaskins, *University of Virginia, Charlottesville, VA, United States*, Sean O'Malley, *Rutgers University, Camden, NJ, United States*, Patrick E. Hopkins, *University of Virginia, Charlottesville, VA, United States*

10:42am – Origin and Evolution of Microlayer in a Vapor Bubble During Pool Boiling

Technical Presentation. IMECE2018-88965
 An Zou, Manish Gupta, Shalabh Maroo, *Syracuse University, Syracuse, NY, United States*

11:03am – Simulation of Nucleate Boiling With Interfacial Temperature Gradients and Sharp Interface

Technical Paper Publication. IMECE2018-87998
 Satish Kandlikar, Isaac Perez-Raya, *Rochester Institute of Technology, Rochester, NY, United States*

11:24am – Role and Enhancement of Micro-Nucleation in Annular Flow-Boiling

Technical Presentation. IMECE2018-86343
 Amitabh Narain, Patcharapol Gorgitrattanakul, *Michigan Technological University, Houghton, MI, United States*, Ritunesh Kumar, *Indian Institute of Technology, Indore, India*, Hrishikesh Ranga Prasad, Sunil Mehendale, Soroush Sepahyar, *Michigan Technological University, Houghton, MI, United States*

10-23 K9-3 PHONONIC CRYSTALS AND THERMOELECTRICS

10-23-1 K9-3 Phononic Crystals and Thermoelectrics – I
 Third Floor, David L. Lawrence Convention Center, Room 330
 10:00am–11:45am

Session Chair: Yanliang Zhang, *University of Notre Dame, Notre Dame, IN, United States*

Session Co-Chair: Tianli Feng, *Vanderbilt University/Oak Ridge National Laboratory, Oak Ridge, TN, United States*

10:00am – Lattice Thermal Conductivity of Nanostructured Thermoelectric Materials

Technical Presentation. IMECE2018-87177
 Bo Fu, Guihua Tang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

10:21am – Thermal and Thermoelectric Transport in Additive Printed Nanostructured Flexible Thermoelectric Films

Technical Presentation. IMECE2018-87729
 Yanliang Zhang, *University of Notre Dame, Notre Dame, IN, United States*, Tony Varghese, *Boise State University, Boise, ID, United States*, Nick Kempf, Mortaza Saeidi-Javash, *University of Notre Dame, Notre Dame, IN, United States*

10:42am – Interatomic Potential Development for Thermal Conductivity Prediction Of Materials: The Complex Binary Compound Sb_2Te_3

Technical Presentation. IMECE2018-88650
 Prabudhya Roy Chowdhury, *Purdue University, West Lafayette, IN, United States*, Tianli Feng, *Vanderbilt University/Oak Ridge National Laboratory, Oak Ridge, TN, United States*, Xiulin Ruan, *Purdue University, West Lafayette, IN, United States*

11:03am – Thermoelectric Transport in Bismuth Telluride Nanoribbon With Surface Protection by Organic Molecule Coating

Technical Presentation. IMECE2018-89557
 Wei Wu, Michael Pettes, *University of Connecticut, Storrs, CT, United States*

11:24am – Thermal Conductivity in CdO Modulation-Doped Single Lattice Films (MoDSiLFs)

Technical Presentation. IMECE2018-89890

Elizabeth Radue, *University of Virginia, Charlottesville, VA, United States*, Evan L. Runnerstrom, *NCSU, Raleigh, NC, United States*, Christina M. Rost, *University of Virginia, Charlottesville, VA, United States*, Brian F. Donovan, *U.S. Naval Academy, Annapolis, MD, United States*, Everett D. Grimley, James M. LeBeau, *NCSU, Raleigh, NC, United States*, Jon-Paul Maria, *Pennsylvania State University, University Park, PA, United States*, Patrick Hopkins, *University of Virginia, Charlottesville, VA, United States*

10-33 K11-2 CMS- SPRAYS AND EMISSIONS

10-33-1 CMS – Sprays and Emissions

Third Floor, David L. Lawrence Convention Center, Room 326
10:00am–11:45am

Session Chair: Mohsen Ghamari, *Wilkes University, Wilkes-Barre, PA, United States*

Session Co-Chair: Mohsen Ayoobi, *Wayne State University, Detroit, MI, United States*

10:00am – Cubic Formula for Determination of the Drop Size During Atomization of Liquid Jets in Co- and Cross-Flow of Air

Technical Paper Publication. IMECE2018-86372

Taewoo Lee, Jung Eun Park, *Arizona State University, Tempe, AZ, United States*, Ryoichi Kurose, *Kyoto University, Kyoto, Japan*

10:21am – Nitrogen-Bearing Emissions From Combustion of Raw and Torrefied Corn Straw in a Fixed-Bed Reactor

Technical Paper Publication. IMECE2018-86612

Xiaohan Ren, *Shandong University, Jinan, Shandong, China*, Emad Rokni, *Northeastern University, Brookline, MA, United States*, Yu Liu, Zheng Cui, *Shandong University, Jinan, Shandong, China*, Yiannis Leventis, *Northeastern University, Boston, MA, United States*

10:42am – Influence of Injection Angle on Pollutant Emissions and Combustion Temperature on a CFM56-3 Engine

Technical Paper Publication. IMECE2018-87353

Pedro C. Moreira, *Universidade da Beira Interior, Covilhã, Portugal*, Francisco Brojo, *Universidade da Beira Interior, Beira, Portugal*

11:03am – Preliminary Development of a Measurement Standard Using a Research Simplex Atomizer

Technical Paper Publication. IMECE2018-87940

Scott Leask, Alice Li, Vincent McDonell, Scott Samuelsen, *University of California, Irvine, CA, United States*

11:24am – Thermal Conductivity of Colloidal Suspensions of Jet Fuel and Carbon-Based Nanoparticles and Its Effect on Evaporation Rate

Technical Paper Publication. IMECE2018-88618

Mohsen Ghamari, Ahmed Aboalhamayie, *Wilkes University, Wilkes-Barre, PA, United States*

10-36 K13-1 HEAT TRANSFER IN MULTIPHASE SYSTEMS

10-36-1 K13-1 Heat Transfer in Multiphase Systems – I
Fourth Floor, David L. Lawrence Convention Center, Room 406
10:00am–11:45am

Session Chair: Abhijit Mukherjee, *California State University Northridge, Northridge, CA, United States*

10:00am – Experimental Investigation on Heat Transfer Characteristics of Smooth Water Wall Tube of an Ultra-Supercritical CFB Boiler

Technical Paper Publication. IMECE2018-86137

Wenyu Wang, Ziyu Liang, Li Wan, Dan Liu, Dong Yang, *Xi'an Jiaotong University, Xi'an, China*

10:21am – A Correlation for Maximum Heat Transfer to Cylinders and Spheres in Gas-Fluidized Beds

Technical Paper Publication. IMECE2018-86586

Mirza Mohammed Shah, *Engineering Research Associates, Redding, CT, United States*

10:42am – General Correlation for Heat Transfer During Two-Component Gas-Liquid Flow in Horizontal Pipes

Technical Paper Publication. IMECE2018-86589

Mirza Mohammed Shah, *Engineering Research Associates, Redding, CT, United States*

11:03am – A Correlation for Heat Transfer to Two-Component Gas-Liquid Flowing in Vertical Channels

Technical Paper Publication. IMECE2018-86590

Mirza Mohammed Shah, *Engineering Research Associates, Redding, CT, United States*

11:24am – CFD Analysis of Direct Contact Condensation (DCC) of Subsonic Steam Jets in a Cross-Flow of Water Using a Two-Fluid Model

Technical Paper Publication. IMECE2018-87382

Jayachandran K. N., Arnab Roy, Parthasarathi Ghosh, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

10-42 K16-1: HEAT TRANSFER IN ELECTRONIC EQUIPMENT

10-42-2 K16-1: Heat Transfer in Electronic Equipment – II
Third Floor, David L. Lawrence Convention Center, Room 327
10:00am–11:45am

Session Chair: Seungbae Park, *Binghamton University, Binghamton, NY, United States*

Session Co-Chair: Hendrik PJ De Bock, *GE Global Research, Schenectady, NY, United States*

10:00am – Thermal Transport at Ga₂O₃/Metal Interfaces and Bulk Ga₂O₃ Polymorphs

Technical Presentation. IMECE2018-86459

Henry Aller, Xiaoxiao Yu, Andrew Gellman, Jonathan Malen, Alan McGaughey, *Car United States*

10:21am – Thermal Analysis of a Subscale Flux Focusing Magnetic Gearbox

Technical Paper Publication. IMECE2018-86876
Sina Modaresahmadi, Javad Khalesi, Josh Kadel, Wesley Williams, *University of North Carolina at Charlotte, Charlotte, NC, United States*

10:42am – Validation and Evaluation of Turbulence Models in Thermal Predictions of a Small Data Center Facility

Technical Paper Publication. IMECE2018-87479
Beichao Hu, Long Phan, Cheng-Xian Lin, *Florida International University, Miami, FL, United States*

11:03am – An Experimental Study on the Convective Heat Transfer Behavior of Diamond Nanofluids in Electronic Cooling Applications

Technical Paper Publication. IMECE2018-87481
Farzin Mashali, Ethan Languri, *Tennessee Technological University, Cookeville, TN, United States*, **Jim Davidson, David Kerns**, *FemtoScience, Nashville, TN, United States*, **Fahad Alkhalidi**, *Tennessee Technological University, Cookeville, TN, United States*

11:24am – Micron Variations of the Thermal Conductivity of Copper-Tin Intermetallics

Technical Presentation. IMECE2018-88551
Matthias Daeumer, Scott Schiffres, *SUNY Binghamton, Binghamton, NY, United States*, **Charles L. Arvin**, *IBM, Hopewell Junction, NY, United States*

10-7 K6-6 RADIATIVE HEAT TRANSFER AND RADIATIVE PROPERTIES OF ENERGY SYSTEMS

10-7-2 Radiative Properties

Third Floor, David L. Lawrence Convention Center, Room 321
1:45pm–3:30pm

Session Chair: Rydge Mulford, *Brigham Young University, Provo, UT, United States*

1:45pm – Directional Radiative Properties of Thin Polytetrafluoroethylene (PTFE) Sheets on a Silver Film

Technical Presentation. IMECE2018-87882
Peiyan Yang, Zhuomin Zhang, Chuayang Chen, *Georgia Institute of Technology, Atlanta, GA, United States*

2:06pm – How to Make Silica Aerogel Transparent?

Technical Presentation. IMECE2018-88885
Tiphaine Galy, *University of California, Los Angeles, Los Angeles, CA, United States*, **Mu Du, Guihua Tang**, *Xi'an Jiaotong University, Xi'an, China*, **Laurent Pilon**, *University of California, Los Angeles, Los Angeles, CA, United States*

2:27pm – Selective Thermal Radiation From Nanoribbons

Technical Presentation. IMECE2018-89679
Mahmoud Elzouka, Ravi Prasher, *Lawrence Berkeley National Laboratory, Berkeley, CA, United States*

2:48pm – Measurement of the Radiative Surface Properties of Opaque Materials

Technical Presentation. IMECE2018-87771
Christopher Brooks, Matthew R. Jones, *Brigham Young University, Provo, UT, United States*

10-15 K8-1 FUNDAMENTALS OF BOILING AND CONDENSATION ? I

10-15-2 K8-1 Fundamentals of Boiling

Third Floor, David L. Lawrence Convention Center, Room 320
1:45pm–3:30pm

Session Chair: Amitabh Narain, *Michigan Tech University, Houghton, MI, United States*

Session Co-Chair: Isaac Perez-Raya, *Rochester Institute of Technology, Rochester, NY, United States*

1:45pm – A Novel Multiscale Wick Structure for Delayed Critical Heat Flux in Microchannel Flow Boiling Process

Technical Presentation. IMECE2018-88292
Mojtaba Hosseinnia, Sajjad Bigham, *Michigan Technological University, Houghton, MI, United States*

2:06pm – Boiling Heat Transfer on a Two-Tier Copper Structure of Nanowires and Microgrooves

Technical Presentation. IMECE2018-88825
Guanglei Chen, Calvin Hong Li, *Villanova University, Villanova, PA, United States*

2:27pm – Molecular Dynamics Simulation of Explosive Boiling on Concave Nanostructured Surface

Technical Paper Publication. IMECE2018-86965
Pengfei Ji, Mengzhe He, Yiming Rong, *Southern University of Science and Technology, Shenzhen, Guangdong, China*, **Yuwen Zhang**, *University of Missouri, Columbia, MO, United States*, **Yong Tang**, *South China University of Technology, Guangzhou, Guangdong, China*

2:48pm – Investigation of Bubble Departure Radius in Subcooled Pool Boiling Under Microgravity Condition

Technical Paper Publication. IMECE2018-87741
Xueli Wang, *Xi'an Jiaotong University, Xi'an, China*, **Zan Wu**, *Lund University, Lund, Sweden*, **Jinjia Wei**, *Xi'an Jiaotong University, Xi'an, China*, **Bengt Sundén**, *Lund University, Lund, Sweden*

3:09pm – Multi-Fractal Analysis of Surface Temperature Time Series to Predict the Critical Heat Flux

Technical Presentation. IMECE2018-89500
Ankit Saini, Vinod Srinivasan, *University of Minnesota, Minneapolis, MN, United States*

10-23 K9-3 PHONONIC CRYSTALS AND THERMOELECTRICS

10-23-2 K9-3 Phononic Crystals and Thermoelectrics – II
Third Floor, David L. Lawrence Convention Center, Room 330
1:45pm–3:30pm

Session Chair: Tianli Feng, *Vanderbilt University/Oak Ridge National Laboratory, Oak Ridge, TN, United States*

Session Co-Chair: Ruiqiang Guo, *Caltech, Pasadena, CA, United States*

1:45pm – Anisotropic Thermal Transport in Single-Crystal Group-III Nitride Films Extrinsicly Induced by Highly-Oriented Dislocations

Technical Presentation. IMECE2018-89505

Bo Sun, *National University of Singapore, Singapore, Singapore*, **Georg Haunschild**, *Technical University of Munich, Garching, Germany*, **Carlos Polanco**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **James (Zi-Jian) Ju**, *Technical University of Munich, Garching, Germany*, **Lucas Lindsay**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Gregor Koblmüller**, *Technical University of Munich, Garching, Germany*, **Yee Kan Koh**, *National University of Singapore, Singapore, Singapore*

2:06pm – Probing the Lower Limit of Lattice Thermal Transport in One-Dimensional Phononic Crystals

Technical Presentation. IMECE2018-89708

Pranay Chakraborty, **Lei Cao**, **Yan Wang**, *University of Nevada, Reno, Reno, NV, United States*

2:27pm – Investigations of Encapsulated Phase Change Material in Boron Nitride Nanotubes

Technical Presentation. IMECE2018-89778

Nastaran Barhemmati-Rajab, **Weihuan Zhao**, *University of North Texas, Denton, TX, United States*

2:48pm – Thermal Conductivity Measurement of Methylammonium Lead Iodide Based Ruddlesden Popper Perovskite Phases

Technical Presentation. IMECE2018-87814

Alexander D. Christodoulides, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Peijun Guo**, *Argonne National Laboratory, Lemont, IL, United States*, **Constantinos Stoumpos**, **Mercouri G. Kanatzidis**, *Northwestern University, Evanston, IL, United States*, **Richard Schaller**, *Argonne National Laboratory/Northwestern University, Lemont, IL, United States*, **Jonathan Malen**, *Carnegie Mellon University, Pittsburgh, PA, United States*

10-34 K11-3 CMS- APPLIED COMBUSTION

10-34-1 CMS–Applied Combustion: Modeling Heat Transfer and Combustion
Third Floor, David L. Lawrence Convention Center, Room 326
1:45pm–3:30pm

Session Chair: Mehdi Esmailpour, *Marshall University, Huntington, WV, United States*

Session Co-Chair: Kris Jorgensen, *A. O. Smith, Brookfield, WI, United States*

1:45pm – Numerical Modeling of Water Impingement and Heat Transfer With Solid Slabs During Secondary Cooling in a Continuous Caster

Technical Paper Publication. IMECE2018-86691

Haibo Ma, **Kaile Tang**, *Purdue University Northwest CIVS, Hammond, IN, United States*, **Rui Liu**, **Michael Lowry**, *ArcelorMittal, East Chicago, IN, United States*, **Armin Silaen**, *Purdue University Northwest CIVS, Hammond, IN, United States*, **Chenn Zhou**, *Purdue University Calumet, Hammond, IN, United States*

2:06pm – Optimization of Heat Transfer Process in a Walking Beam Reheat Furnace Using Computational Fluid Dynamics

Technical Paper Publication. IMECE2018-88117

Yuchao Chen, *Purdue University Northwest, Hammond, IN, United States*, **Armin Silaen**, *Purdue University Northwest CIVS, Hammond, IN, United States*, **Nicholas Walla**, *Purdue University Northwest, Hammond, IN, United States*, **Kurt Johnson**, *ArcelorMittal Global Research and Development, East Chicago, IN, United States*, **Chenn Zhou**, *Purdue University Calumet, Hammond, IN, United States*

2:27pm – CFD Modelling of NO_x and Soot Formation in Aluminum Anode Baking Furnace

Technical Paper Publication. IMECE2018-88390

Abdul Raouf Tajik, *Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir.*, **Tariq Shamim**, *University of Michigan-Flint, Flint, MI, United States*, **Ahmed Ghoniem**, *Massachusetts Institute of Technology, Cambridge, MA, United States*, **Rashid K. Abu Al-Rub**, *Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.*

2:48pm – Modeling for Mineral Redistribution of Coal Blending During Pulverized Coal Combustion

Technical Paper Publication. IMECE2018-87834

Md. Saifujaman, *Arkansas State University, Jonesboro, AR, United States*, **Kwangkook Jeong**, *Arkansas State University, State University, AR, United States*, **Shinku Lee**, *Doosan Heavy Industries & Construction Co., Ltd., Gyeongnam, Korea (Republic)*

3:09pm – CFD Analysis of Premixed Combustion in a Two Stroke Polygon Engine

Technical Presentation. IMECE2018-89361

Christian Mendez, **Kevin Anderson**, *Califor University, Pomona, CA, United States*

10-36 K13-1 HEAT TRANSFER IN MULTIPHASE SYSTEMS

10-36-2 K13-1 Heat Transfer in Multiphase Systems – II
Fourth Floor, David L. Lawrence Convention Center, Room 406
1:45pm–3:30pm

Session Chair: Scott Thompson, *Auburn University, Auburn, AL, United States*

1:45pm – Effect of Particle-Laden Flow on Heat Transfer

Technical Presentation. IMECE2018-88005

Sarah R. Masters, Michael Manahan, Jr., Pennsylvania State University, State College, PA, United States

2:06pm – Functional Coating Durability

Technical Presentation. IMECE2018-88110

Muhammad Jahidul Hoque, Longnan Li, Nenad Miljkovic, University of Illinois at Urbana-Champaign, Urbana, IL, United States

2:27pm – Three-Dimensional Multiple-Relaxation-Time Lattice Boltzmann Simulation of Vapor Condensation on Subcooled Wall

Technical Paper Publication. IMECE2018-88490

Wandong Zhao, Nanchang University, Nanchang, Jiangxi, China, Ben Xu, University of Texas Rio Grande Valley, Edinburg, TX, United States, Ying Zhang, Nanchang University, Nanchang, Jiangxi, China

2:48pm – Temperature Profile Across Liquid-Vapor Interface With Phase Change: Results From Molecular Dynamics Simulations

Technical Presentation. IMECE2018-89202

Arif Rokoni, Ying Sun, Drexel University, Philadelphia, PA, United States

3:09pm – Numerical Study of Bubble Dynamics During Nucleate Pool Boiling of Nanofluids

Technical Presentation. IMECE2018-89266

Abhijit Mukherjee, Goutham Kumar Reddy Burla, California State University Northridge, Northridge, CA, United States, Yash Jawanjal, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India

10-53 K20-3 APPLICATIONS OF COMPUTATIONAL HEAT TRANSFER

10-53-1 Applications of Computational Heat Transfer: Convection

Third Floor, David L. Lawrence Convention Center, Room 327
1:45pm–3:30pm

Session Chair: Samuel Subia, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: Aaron Wemhoff, *Villanova University, Villanova, PA, United States*

1:45pm – Numerical Modeling for a Supercritical CO₂-Liquid Sodium Hybrid Compact Heat Exchanger

Technical Paper Publication. IMECE2018-86682

Sean Kissick, Hailei Wang, Oregon State University, Corvallis, OR, United States

2:06pm – Calibration of External Heat Transfer Coefficients During Cooling of a Partially-Filled Water Tank Using Measured Temperature-Time Data

Technical Paper Publication. IMECE2018-86716

Vishal Ramesh, Sandip Mazumder, Ohio State University, Columbus, OH, United States, Gurpreet Matharu, Dhaval Vaishnav, Syed Ali, Don Lawrence, Jatin Desai, Mohsen Ehteshami, Ford Motor Company, Dearborn, MI, United States

2:27pm – Preliminary Heat Transfer Simulation Model of a Novel Dynamic Thermal Ablation Probe

Technical Paper Publication. IMECE2018-86874

Joseph Nakao, Yen-Lin Han, Seattle University, Seattle, WA, United States

2:48pm – Analysis of Flow and Thermal Stress in a Blast Furnace Blowpipe

Technical Paper Publication. IMECE2018-88468

Yuhan Cui, Justina Lee, Nicholas Walla, Purdue University Northwest, Hammond, IN, United States, Armin Silaen, Purdue University Northwest CIVS, Hammond, IN, United States, Dale Goodloe, ArcelorMittal, East Chicago, IN, United States, Chenn Zhou, Purdue University Calumet, Hammond, IN, United States

3:09pm – Numerical Heat Transfer Study of Combined Water and Air Cooling in a High-Speed Electric Motor

Technical Presentation. IMECE2018-89401

Jun Lin, Kevin Anderson, California State Polytech University, Pomona, CA, United States

10-6 K6-5 THERMAL MANAGEMENT OF BATTERY SYSTEMS

10-6-2 Capacitors

Fourth Floor, David L. Lawrence Convention Center, Room 407
3:45pm–5:30pm

Session Chair: Leitao Chen, *Rice University, Houston, TX, United States*

3:45pm – Heat Generation Rate Measurements in Hybrid Supercapacitors Devices

Technical Presentation. IMECE2018-88886

Obaidallah Munteshari, Jonathan Lau, Ampol Likitchatchawankun, Bing-Ang Mei, Christopher Choi, Bruce Dunn, Laurent Pilon, *University of California, Los Angeles, Los Angeles, CA, United States*

4:06pm – Heat Generation in All-Solid-State Supercapacitors With Graphene Electrodes and Gel Electrolytes

Technical Presentation. IMECE2018-88899

Ampol Likitchatchawankun, *University of California, Los Angeles, Los Angeles, CA, United States*, Arpan Kundu, *Purdue University, West Lafayette, IN, United States*, Obaidallah Munteshari, Timothy Fisher, Laurent Pilon, *University of California, Los Angeles, Los Angeles, CA, United States*

4:27pm – Continuum Modeling of Heat Generation in Porous Electrical Double-Layer Capacitors During Galvanostatic Charge/Discharge

Technical Presentation. IMECE2018-88903

Arpan Kundu, *Purdue University, West Lafayette, IN, United States*, Laurent Pilon, Timothy Fisher, *University of California, Los Angeles, Los Angeles, CA, United States*

10-10 K6-9 TWO PHASE TRANSPORT IN ENERGY SYSTEMS AND NON-EQUILIBRIUM AND DYNAMIC ENERGY SYSTEMS

10-10-1 K6-9 Two Phase Transport in Energy Systems and Non-Equilibrium and Dynamic Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 321
3:45pm–5:30pm

Session Chair: David Pratt, *USAF, WPAFB, OH, United States*

3:45pm – Calculation of Evaporation From Fukushima NPP Spent Fuel Pools

Technical Paper Publication. IMECE2018-86561

Mirza Mohammed Shah, *Engineering Research Associates, Redding, CT, United States*

4:06pm – An Influence of the Numerical Modeling of the Transition Between the Stator and Rotor on the Thermodynamic Condensation Loss in the Low-Pressure Part of a Steam Turbine

Technical Paper Publication. IMECE2018-86571

Guk-choi Jun, *Czech Technical University in Prague, Prague, Czech Republic*, Lukas Mrozek, *University of West Bohemia, Pilsen, Czech Republic*

4:27pm – Pool Boiling Heat Transfer of N-Pentane and Acetone on Nanostructured Surfaces by Electrophoretic Deposition

Technical Paper Publication. IMECE2018-87752

Zan Wu, Anh Duc Pham, Zhen Cao, *Lund University, Lund, Sweden*, Cathrine Albèr, Peter Falkman, Tautgirdas Ruzgas, *Malmö University, Malmö, Sweden*, Bengt Sunden, *Lund University, Lund, Sweden*

4:48pm – Supply Air Temperature Prediction in an Air-Handling Unit Using Artificial Neural Network

Technical Paper Publication. IMECE2018-88507

Nikita R. Sukthankar, Abhishek Uday Walekar, Dereje Agonafer, *University of Texas at Arlington, Arlington, TX, United States*

5:09pm – Numerical Study on the Performance Characteristics of Cylindrical Heat Pipes With Differing Wick Type

Technical Paper Publication. IMECE2018-86607

Mahboobe Mahdavi, Saeed Tiari, Ajaysinh B. Solanki, Vivek Pawar, *Gannon University, Erie, PA, United States*

10-15 K8-1 FUNDAMENTALS OF BOILING AND CONDENSATION – I

10-15-3 K8-1 Fundamentals of Boiling, Evaporation, and Condensation

Third Floor, David L. Lawrence Convention Center, Room 320
3:45pm–5:30pm

Session Chair: Diana-Andra Borca-Tasciuc, *Rensselaer Polytech Institute, Troy, NY, United States*

Session Co-Chair: Navdeep Dhillon, *California State University Long Beach, Long Beach, CA, United States*

3:45pm – Electrowetting-Induced Rapid Coalescence and Shedding of Droplets During Condensation of Moist Air

Technical Presentation. IMECE2018-88973

Enakshi Wikramanayake, Vaibhav Bahadur, *University of Texas at Austin, Austin, TX, United States*

4:06pm – Hierarchical Microporous Surfaces for Enhancing Capillary Boiling Heat Transfer

Technical Presentation. IMECE2018-87270

Rongfu Wen, Shanshan Xu, Yung-Cheng Lee, Ronggui Yang, *University of Colorado Boulder, Boulder, CO, United States*

4:27pm – Producing Syngas From Glycerol by Film Boiling

Technical Presentation. IMECE2018-87613

Pushan Sharma, C. Thomas Avedisian, Jordan D. Brunson, *Cornell University, Ithaca, NY, United States*, Wing Tsang, *National Institute of Standards and Technology, Gaithersburg, MD, United States*, Ivan Keresztes, *Cornell University, Ithaca, NY, United States*

4:48pm – Theoretical Model of Droplets Motions on Solid Surface With Radial Wettability and Evaporation Rate Gradients

Technical Paper Publication. IMECE2018-87890

Yanjie Yang, Zan Wu, Lund University, Lund, Sweden, **Xiaoqian Chen**, National University of Defense Technology, Changsha, China, **Bengt Sunden**, Lund University, Lund, Sweden, **Yiyong Huang**, National University of Defense Technology, Changsha, China

5:09pm – Molecular Simulation of Steady-state Evaporation and Condensation in the Presence of a Non-Condensable Gas

Technical Presentation. IMECE2018-86180

Zhi Liang, California State University, Fresno, Clovis, CA, United States, **Pawel Keblinski**, RPI, Troy, NY, United States

10-25 K9-5 MICRO/NANOSCALE PHASE CHANGE HEAT TRANSFER

10-25-1 K9-5 Micro-/Nanoscale Phase Change Heat Transfer – I

**Third Floor, David L. Lawrence Convention Center, Room 330
3:45pm–5:30pm**

Session Chair: Dong Liu, University of Houston, Houston, TX, United States

Session Co-Chair: Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States

3:45pm – Fast Evaporation From Single Graphene Nanopore

Technical Presentation. IMECE2018-89652

Siyang Xiao, Boston University, Allston, MA, United States, **Chuanhua Duan**, Boston University, Boston, MA, United States

4:06pm – Effects of Size, Shape and Porosity on Evaporation From Nanopores

Technical Presentation. IMECE2018-89669

Haowen Chen, Chuanhua Duan, Boston University, Boston, MA, United States

4:27pm – Computational Study of Thermodynamics and Transport of Water Confined Between Graphene

Technical Presentation. IMECE2018-89864

Ujash Shah, Timothy Fisher, University of California, Los Angeles, Los Angeles, CA, United States

4:48pm – Molecular Dynamics Simulation of Thin-Film Evaporation From Nanocoated Surfaces: An Investigation of the Role of Surface Wettability Interfacial Thermal Resistance on the Evaporation Rate

Technical Presentation. IMECE2018-90017

Binjian Ma, Washington University in St. Louis, College Station, TX, United States, **Li Shan**, Washington University in St. Louis, St. Louis, MO, United States, **Baris Dogruoz**, Cisco Systems Inc., Santa Clara, CA, United States, **Damena Agonafer**, Washington University in St. Louis, Saint Louis, MO, United States

5:09pm – Fundamental Mechanisms of Evaporation Kinetics of Non-Spherical Microdroplets Confined by Asymmetric Micropillar Structures

Technical Presentation. IMECE2018-90018

Li Shan, Washington University in St. Louis, St. Louis, MO, United States, **Binjian Ma**, Washington University in St. Louis, College Station, TX, United States, **Baris Dogruoz**, Cisco Systems Inc., Santa Clara, CA, United States, **Damena Agonafer**, Washington University in St. Louis, Saint Louis, MO, United States

10-34 K11-3 CMS- APPLIED COMBUSTION

10-34-2 CMS–Applied Combustion: Improving System Performance

**Third Floor, David L. Lawrence Convention Center, Room 326
3:45pm–5:30pm**

Session Chair: Kris Jorgensen, A. O. Smith, Brookfield, WI, United States

Session Co-Chair: Mehdi Esmaeilpour, Marshall University, Huntington, WV, United States

3:45pm – Correlating Thermal Characteristics From Flow-Reactor Experiments With Primary Reference Fuel

Technical Paper Publication. IMECE2018-88042

Jun-Chun Wong, Super Micro Computer, Inc., San Jose, CA, United States, **Lea Der Chen**, Texas A&M University - Corpus Christi, Corpus Christi, TX, United States

4:06pm – Influence of Renewable Gas Addition to Natural Gas on the Combustion Performance of Cooktop Burners

Technical Paper Publication. IMECE2018-87932

Yan Zhao, Shiny Choudhury, Vincent McDonell, University of California, Irvine, CA, United States

4:27pm – Preheat Limits in Practical Combustor Design: Experiments and Simulations

Technical Paper Publication. IMECE2018-88111

Aleksandr Fridlyand, Brian Sutherland, Paul Glanville, Gas Technology Institute, Des Plaines, IL, United States

4:48pm – Water/Steam Injection for NOx Reduction in Process Burners

Technical Paper Publication. IMECE2018-88688

Steve Londerville, Coen, Hayward, CA, United States, **Kevin Anderson**, Coen, Sacramento, CO, United States, **Charles Baukal**, John Zink Co. LLC, Tulsa, OK, United States, **Wes Bussman**, John Zink Hamworthy Combustion, Tulsa, OK, United States

5:09pm – Infrared Thermography to Measure Heat Transfer of a Heated Curved Thin Sheet

Technical Paper Publication. IMECE2018-86172

Gaofeng Wang, Liang Zhong, Yifan Xia, Zhejiang University, Hangzhou, Zhejiang, China

10-39 K14-1 GAS TURBINE HEAT TRANSFER AND COOLING

10-39-1 Gas Turbine Heat Transfer and Cooling

Fourth Floor, David L. Lawrence Convention Center, Room 405
3:45pm–5:30pm

Session Chair: Stephen Lynch, *Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: Andrew Nix, *West Virginia University, Morgantown, WV, United States*

3:45pm – Effect of Nozzle-to-Target Spacing on Fin Effectiveness and Convective Heat Transfer Coefficient for Array Jet Impingement Onto Novel Micro-Roughness Structures

Technical Paper Publication. IMECE2018-86501

Prashant Singh, *North Carolina State University, Raleigh, NC, United States*, Mingyang Zhang, *Virginia Tech, Blacksburg, VA, United States*, Shoaib Ahmed, Srinath Ekkad, *North Carolina State University, Raleigh, NC, United States*

4:06pm – Simulation of Film Cooling Heat Transfer and Simulation Improvement With a Modified DES Turbulence Model

Technical Paper Publication. IMECE2018-86887

Feiyan Yu, Savas Yavuzkurt, *Pennsylvania State University, University Park, PA, United States*

4:27pm – Large Eddy Simulations of Discrete Film Cooling With Different Freestream Turbulence Levels

Technical Presentation. IMECE2018-89763

Yousef Kanani, Sumanta Acharya, *Illinois Institute of Technology, Chicago, IL, United States*

4:48pm – Large-Eddy Simulations of Low Pressure Turbine Endwall Flow and Heat Transfer

Technical Paper Publication. IMECE2018-87876

Stephen Lynch, *Pennsylvania State University, University Park, PA, United States*

5:09pm – A Novel Air-Air Heat Exchanger Design and Experimental Validation for Aero-Engines

Technical Paper Publication. IMECE2018-87169

Yinlong Liu, Yanchen Fu, Haoran Huang, Jie Wen, Guoqiang Xu, *Beihang University, Beijing, China*

10-40 K15-1 TRANSPORT PHENOMENA IN MANUFACTURING AND MATERIALS PROCESSING

10-40-2 K15-1 Transport Phenomena in Manufacturing and Materials Processing – II

Fourth Floor, David L. Lawrence Convention Center, Room 406
3:45pm–5:30pm

Session Chair: Patrick Mensah, *Southern University, Baton Rouge, LA, United States*

Session Co-Chair: Ying Sun, *Drexel University, Philadelphia, PA, United States*

3:45pm – Thermal Stress Associated With Non-Fourier Heat Conduction in Femtosecond Laser Heating of Multilayer Metallic Films

Technical Paper Publication. IMECE2018-86144

Swarup Bag, *IIT Guwahati, Guwahati, India*, M. Ruhul Amin, *Montana State University, Bozeman, MT, United States*

4:06pm – A Study of Photo-Thermal-Fluids Transport Phenomena With Marangoni Effect of Laser Micro-Patterning Process

Technical Presentation. IMECE2018-88808

Ming-Tsang Lee, *National Tsing Hua University, Hsinchu, Taiwan*

4:27pm – An Experimental Setup for Multiple Air Jet Impingement Over a Surface

Technical Paper Publication. IMECE2018-87995

Flávia Barbosa, Joao Silva, Pedro Ribeiro, Senhorinha Teixeira, Delfim Soares, *University of Minho, Guimarães, Portugal*, Duarte Santos, *Bosch Car Multimedia SA, Braga, Portugal*, Maria Cerqueira, *Physics Department, Braga, Portugal*, Jose Teixeira, *University of Minho, Guimarães, Portugal*

10-53 K20-3 APPLICATIONS OF COMPUTATIONAL HEAT TRANSFER

10-53-2 Applications of Computational Heat Transfer: Industrial Applications

Third Floor, David L. Lawrence Convention Center, Room 327
3:45pm–5:30pm

Session Chair: Samuel Subia, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: Aaron Wemhoff, *Villanova University, Villanova, PA, United States*

3:45pm – Study on Cutting Temperature Modeling of Machined Workpiece in End Milling In Situ TiB₂/7050Al MMCs

Technical Paper Publication. IMECE2018-87319

Yifeng Xiong, Wenhui Wang, Ruisong Jiang, Kunyang Lin, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*

4:06pm – Air Flow Velocity Field Validation and Turbulence Studies on a Single Rack Model in Data Centers

Technical Paper Publication. IMECE2018-86575

Long Phan, Beichao Hu, Cheng-xian Lin, *Florida International University, Miami, FL, United States*

4:27pm – CFD Model of the Turboprop Engine Hot Part: Bay Cooling

Technical Paper Publication. IMECE2018-87066

Goran Simeunovic, Petr Hatschbach, Lukas Popelka, *Czech Technical University in Prague, Prague, Czech Republic*

4:48pm – Combined Computational and Experimental Analysis of Cooldown of a Surrogate Engine Mount Assembly

Technical Paper Publication. IMECE2018-87139

Navni N. Verma, Andrei Iacob, Sandip Mazumder, Ahmet Selamet, *Ohio State University, Columbus, OH, United States*

5:09pm – Dynamic Numerical Simulation of Heat Transfer and Fluid Flow in Sustainable Farming Compartment

Technical Presentation. IMECE2018-89254

Jae Sung Park, Siamak Mirfendereski, *University of Nebraska–Lincoln, Lincoln, NE, United States*, M. Sina Mousavi, Jongwan Eun, *University of Nebraska–Lincoln, Omaha, NE, United States*

WEDNESDAY, NOVEMBER 14

10-16 K8-2 FUNDAMENTALS OF SINGLE PHASE CONVECTION

10-16-1 K8-2 Fundamentals of Single Phase Convection

**Third Floor, David L. Lawrence Convention Center, Room 331
10:00am–11:45am**

Session Chair: Patrick Oosthuizen, *Queen's University, Kingston, QC, Canada*

Session Co-Chairs: Chris Kobus, *Oakland University, Rochester, MI, United States*, Diana-Andra Borca-Tasciuc, *Rensselaer Polytech Institute, Troy, NY, United States*

10:00am – Measurement of Heat Transfer Coefficient in Interaction Zone of Multiple Liquid Jet Impingement

Technical Presentation. IMECE2018-88888

Chaitanya Ghodake, *Bharat Forge, Pune, Maharashtra, India*

10:21am – Utilizing the Integral Technique to Determine the Similarity Variable in Classical Heat Transfer Problems: Thermal Boundary Layer Theory

Technical Paper Publication. IMECE2018-88662

Chris Kobus, *Oakland University, Rochester, MI, United States*

10:42am – Numerical Study on Apparent Permeability of Porous Media in Slip Gas Flows Based on Lattice Boltzmann Method

Technical Paper Publication. IMECE2018-87152

Zhenyu Liu, Zhiyu Mu, Huiying Wu, *Shanghai Jiao Tong University, Shanghai, China*

11:03am – Nonlinear Analysis of Convection in Ferromagnetic Liquids: Effect of Rotation

Technical Paper Publication. IMECE2018-87367

Anthony Christy Melson, G.N. Sekhar, *BMS College of Engineering, Bengaluru, Karnataka, India*

11:24am – Experimental Investigation of Vapor Compression Cycle Under Influence of Magnetohydrodynamic Force

Technical Paper Publication. IMECE2018-88528

Nikhil Shrikant Mane, *PVPIT, Budhgaon, Sangli, Maharashtra, India*, Narayanrao Hargude, *RIT Sakharale, Budhgaon Maharashtra, India*, Nutan Hargude, *Adarsh Collge, Vita, Sangli, Maharashtra, India*

10-25 K9-5 MICRO/NANOSCALE PHASE CHANGE HEAT TRANSFER

10-25-2 K9-5 Micro-/Nanoscale Phase Change Heat Transfer – II

Third Floor, David L. Lawrence Convention Center, Room 320
10:00am–11:45am

Session Chair: Chuanhua Duan, *Boston University, Boston, MA, United States*

Session Co-Chair: Dong Liu, *University of Houston, Houston, TX, United States*

10:00am – Local Measurement of the Evaporative Heat Transfer Coefficient in Thin Films Using Frequency Domain Thermoreflectance

Technical Presentation. IMECE2018-86605

Xiaoman Wang, Xiaoyue Zhao, Alan McGaughey, Jonathan Malen, *Carnegie Mellon University, Pittsburgh, PA, United States*

10:21am – Interfacial Defrosting

Technical Presentation. IMECE2018-86939

Shreyas Chavan, Kazi Fazle Rabbi, Thomas Foulkes, Kalyan Boyina, Robert Pilawa-Podgurski, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10:42am – Hybrid Surface Derived From PDMS Stamping

Technical Presentation. IMECE2018-88106

Muhammad Jahidul Hoque, Seok Kim, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

11:03am – Thermal Transport Crossover From Crystalline to Partial-Crystalline Partial-Liquid State

Technical Presentation. IMECE2018-88862

Yanguang Zhou, *University of California, Los Angeles, Los Angeles, CA, United States*, **Shiyun Xiong,** *Soochow University, China, Soochow, China*, **Xiaoliang Zhang,** *Dalian University of Technology, China, Dalian, China*, **Sebastian Volz,** *University of Tokyo, Japan, Chatenay, France*, **Ming Hu,** *University of South Carolina, Columbia, DC, United States*

11:24am – Contact Line and Microlayer Movement in a Vapor Bubble During Pool Boiling

Technical Presentation. IMECE2018-88966

An Zou, Shalabh Maroo, *Syracuse University, Syracuse, NY, United States*

10-36 K13-1 HEAT TRANSFER IN MULTIPHASE SYSTEMS

10-36-3 K13-1 Heat Transfer in Multiphase Systems – III Third Floor, David L. Lawrence Convention Center, Room 330 10:00am–11:45am

Session Chair: Vinod Srinivasan, *UMN, Minneapolis, MN, United States*

10:00am – Transient Ash Deposition Modeling in Full-scale Low Temperature Heat Exchangers for Pulverized Coal-fired Power Plant Applications

Technical Presentation. IMECE2018-89694

Sandeep Aryal, Kwangkook Jeong, *Arkansas State University, State University, AR, United States*, **Shinku Lee, Eungchul Lee,** *Doosan Heavy Industries & Construction Co. Ltd., Gyeongnam, Korea (Republic)*

10:21am – Analytical Modeling on Multiphase Heat and Mass Transfer in Full-Scale Gas-to-Gas Cooler for Pulverized Coal-Fired Power Plant Applications

Technical Presentation. IMECE2018-89698

Santosh Tamang, *Arkansas State University, Jonesboro, AR, United States*, **Kwangkook Jeong,** *Arkansas State University, State University, AR, United States*, **Shinku Lee, Eungchul Lee,** *Doosan Heavy Industries & Construction Co. Ltd., Gyeongnam, Korea (Republic)*

10:42am – Thermal Performance of Slurry Flow With Microencapsulated Phase Change Material in Circular Tube

Technical Presentation. IMECE2018-89940

Weiwei Zhu, Hamidreza Shabgard, *University of Oklahoma, Norman, OK, United States*

11:03am – Substrate Thermal Conductivity Controls the Ability to Manufacture Microstructures via Laser-Induced Direct Write

Technical Presentation. IMECE2018-89797

John A. Tomko, David Olson, Jeffrey Braun, Andrew Kelliher, *University of Virginia, Charlottesville, VA, United States*, **Bryan Kaehr,** *Sandia National Laboratories, Albuquerque, NM, United States*, **Patrick E. Hopkins,** *University of Virginia, Charlottesville, VA, United States*

11:24am – Integrated Wick System in Evaporatively-Cooled Heat Sink for Thermal Management of Thermoelectric Generators

Technical Paper Publication. IMECE2018-86904

Michael Ozeh, *Purdue University Northwest, Hammond, IN, United States*, **A. G. Agwu Nnanna,** *University of Texas of the Permian Basin, Odessa, TX, United States*

10-44 K18-1 THERMAL TRANSPORT UNDER HIGH TEMPERATURE AND/OR PRESSURE CONDITIONS

10-44-1 Thermal Transport Under Microscale and Rotating Features

Third Floor, David L. Lawrence Convention Center, Room 333
10:00am–11:45am

Session Chair: Qiuwang Wang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

10:00am – Experimental Investigation on Flow Field in a Rotating Channel With a New TR-PIV System

Technical Paper Publication. IMECE2018-86976
Shengjun Zhou, Haiwang Li, Zhi Tao, Ruquan You, Haoyu Duan, *Beihang University, Beijing, China*

10:21am – Computational Investigation of the Effects of Pseudo-Boiling on Microscale Supercritical CO₂ Heat Transfer

Technical Presentation. IMECE2018-87140
Mahdi Nabil, Alexander Rattner, *Pennsylvania State University, University Park, PA, United States*

10:42am – Experimental Investigation on Boundary Layer Flow Under the Effect of Temperature Gradient in a Smooth Rotating Channel Using Hot-Wire

Technical Paper Publication. IMECE2018-87183
Gangfu Li, Zhi Tao, Huijie Wu, Ruquan You, Haiwang Li, *Beihang University, Beijing, China*

11:03am – Numerical Study on Influencing Factors of Film Cooling on Turbine Blade Leading Edge Under Rotating State

Technical Paper Publication. IMECE2018-87258
Yiwen Ma, Haiwang Li, Meisong Yang, Min Wu, Huimin Zhou, *Beihang University, Beijing, Beijing, China*

11:24am – Rotating Film Cooling Performance of the Hole Near the Leading Edge on the Suction Side of the Turbine Blade

Technical Paper Publication. IMECE2018-86929
Zhiyu Zhou, Haiwang Li, Haichao Wang, Guoqin Zhao, Feng Han, Min Wu, *Beihang University, Beijing, Beijing, China*

10-17 K8-3 FUNDAMENTALS OF MULTI-SCALE MODELING

10-17-1 Fundamentals of Multi-Scale Modeling

Third Floor, David L. Lawrence Convention Center, Room 331
1:45pm–3:30pm

Session Chair: Nicholas Roberts, *Utah State University, Logan, UT, United States*

Session Co-Chair: Alan McGaughey, *Carnegie Mellon University, Pittsburgh, PA, United States*

1:45pm – Long-Wave Homogenization of Porous Media Electromagnetic Heat Exchangers

Technical Presentation. IMECE2018-87408
Joseph Gaone, Burt Tilley, Vadim Yakovlev, *Worcester Polytechnic Institute, Worcester, MA, United States*

2:06pm – From Discrete Ordinate Method to Interpolation Supplemented Lattice Boltzmann Modeling of in-Plane Phonon Transport

Technical Paper Publication. IMECE2018-87590
Dongyang Zhao, Yangyu Guo, *Tsinghua University, Beijing, Beijing, China*

2:27pm – Stochastic Homogenization of Randomly Perturbed, Multiscale Periodic Heat Conduction Problems

Technical Presentation. IMECE2018-89762
Kelechi Ogbuanu, R. Valery Roy, *University of Delaware, Newark, DE, United States*

2:48pm – Multiscale Investigation of Thickness Dependent Melting Thresholds of Nickel Film Under Femtosecond Laser Heating

Technical Paper Publication. IMECE2018-86947
Pengfei Ji, Mengzhe He, Yiming Rong, *Southern University of Science and Technology, Shenzhen, Guangdong, China*, Yuwen Zhang, *University of Missouri, Columbia, MO, United States*, Yong Tang, *South China University of Technology, Guangzhou, Guangdong, China*

3:09pm – A Combined GCMC and FVM Simulation Method for CO₂ Adsorption in 13X Zeolite Adsorption Bed

Technical Paper Publication. IMECE2018-87009
Hui Wang, Jun-Qiang Bai, *Northwestern Polytechnical University, Xi'an, China*, Zhiguo Qu, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, Yu Wang, *Northwestern Polytechnical University, Xi'an, China*, Yang Zhang, *Xi'an Jiaotong University, Xi'an, China*

10-21 K9-1 THERMAL TRANSPORT ACROSS HARD/SOFT INTERFACES

10-21-3 K9-1 Thermal Transport Across Hard/Soft Interfaces – III

Third Floor, David L. Lawrence Convention Center, Room 330
1:45pm–3:30pm

Session Chair: Yee Kan Koh, *National University of Singapore, Singapore, Singapore*

Session Co-Chair: Anil Yuksel, *IBM Corporation, Austin, TX, United States*

1:45pm – Fundamental Study of Multiple Slopes Exhibited by Measured Thermal Contact Conductance (TCC) Versus Load Data for Metal-Metal Contacts

Technical Paper Publication. IMECE2018-86722
Navni N. Verma, Sandip Mazumder, *Ohio State University, Columbus, OH, United States*

2:06pm – Transient Heat and Mass Transfer During Gas Adsorption Into Metal-Organic Frameworks

Technical Presentation. IMECE2018-88057
Hasan Babaei, *University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States*, Christopher E. Wilmer, *University of Pittsburgh, Pittsburgh, PA, United States*

2:27pm – Heat Transfer Modeling of Nanoparticle Packings on a Substrate

Technical Paper Publication. IMECE2018-88642
Anil Yuksel, *IBM Corporation, Austin, TX, United States*, Edward Yu, Michael Cullinan, *University of Texas at Austin, Austin, TX, United States*, Jayathi Murthy, *University of California, Los Angeles, Los Angeles, CA, United States*

2:48pm – Monitoring Heat Transport Across Organic-Inorganic Heterojunctions With Atomic Spatial Resolution

Technical Presentation. IMECE2018-89393
Yue Xiang Yan, Yee Kan Koh, *National University of Singapore, Singapore, Singapore*

10-26 K9-6 NANOSCALE RADIATION HEAT TRANSFER

10-26-1 Measurement of Near-Field Thermal Radiation

Third Floor, David L. Lawrence Convention Center, Room 320
1:45pm–3:30pm

Session Chair: Liping Wang, *Arizona State University, Tempe, AZ, United States*

Session Co-Chair: Bo Zhao, *Stanford University, Stanford, CA, United States*

1:45pm – Near-Field Based Energy Transfer and Conversion in Nanoscale Gaps

Invited Presentation. IMECE2018-89363
Pramod Sangi Reddy, *University of Michigan, Ann Arbor, MI, United States*

2:27pm – Experimental Measurement of the Spectrum of Near-Field Thermal Emission

Technical Presentation. IMECE2018-88834
Saman Zare, Carl Tripp, Sheila Edalatpour, *University of Maine, Orono, ME, United States*

2:48pm – Conversion of Heat to Electricity Using a Nano Gap Near-Field Thermophotovoltaic Device

Technical Presentation. IMECE2018-89352
Linxiao Zhu, Anthony Fiorino, Dakotah Thompson, Rohith Mittapally, Pramod Sangi Reddy, Edgar Meyhofer, *University of Michigan, Ann Arbor, MI, United States*

3:09pm – Near-Field Radiative Thermal Regulation With Electrically Tunable Monolayer Graphene

Technical Presentation. IMECE2018-89213
Xiaoyan Ying, Liping Wang, *Arizona State University, Tempe, AZ, United States*

10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS

10-29-7 Micro-/Nanoelectronics and Related Issues

Third Floor, David L. Lawrence Convention Center, Room 333
1:45pm–3:30pm

Session Chair: Sanjiv Sinha, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chair: Yanbao Ma, *University of California, Merced, Merced, CA, United States*

1:45pm – Phonon Transport Properties of Pristine and Defective Beta-Ga₂O₃

Invited Presentation. IMECE2018-89447
Zhequan Yan, Satish Kumar, *Georgia Institute of Technology, Atlanta, GA, United States*

2:27pm – 3D Anisotropic Thermal Conductivity Tensor of Beta-Ga₂O₃ Measured Using an Elliptical-Beam TDTR Approach

Technical Presentation. IMECE2018-87569
Puqing Jiang, Xin Qian, Ronggui Yang, *University of Colorado Boulder, Boulder, CO, United States*

2:48pm – Ultra-Compliant Heterogeneous Copper-Tin Nanowire Arrays Making a Super-Solder

Technical Presentation. IMECE2018-89168
Wei Gong, Pengfei Li, Yunheng Zhang, *Carnegie Mellon University, Pittsburgh, PA, United States*, Xuhui Feng, *National Renewable Energy Laboratory, Golden, CO, United States*, Joshua Major, Douglas DeVoto, Paul Paret, Charles King, Sreekant Narumanchi, *National Renewable Energy Laboratory, Golden, CO, United States*, Sheng Shen, *Carnegie Mellon University, Pittsburgh, PA, United States*

3:09pm – Multi-Length Scale Electrothermal Simulations of GaN-Based Field Effect Transistors

Technical Presentation. IMECE2018-88133
Qing Hao, Hongbo Zhao, Yue Xiao, *University of Arizona, Tucson, AZ, United States*

10-11 K6-10 PANEL ON THE KEY ROLE OF HEAT TRANSFER ANALYSIS IN ENERGY SYSTEMS RESEARCH

10-11-1 K6-10 Panel on the Key Role of Heat Transfer Analysis and Methodology in Research

Third Floor, David L. Lawrence Convention Center, Room 330
3:45pm–5:30pm

Session Chair: Nesrin Ozalp, *University of Minnesota Duluth, Duluth, MN, United States*

3:45pm – The Key Role of Heat Transfer Analysis in Energy Systems Research

Panel Presentation. IMECE2018-89073

Patrick Oosthuizen, *Queen's University, Kingston, QC, Canada*

4:06pm – Panel on the Key Role of Heat Transfer Analysis in Energy Systems Research

Panel Presentation. IMECE2018-90046

Debjyoti Banerjee, *Texas A&M University, College Station, TX, United States*

4:27pm – Panel on the Key Role of Heat Transfer Analysis in Energy Systems Research

Panel Presentation. IMECE2018-90047

Yaroslav Chudnovsky, *Gas Technology Institute, Des Plaines, IL, United States*

4:48pm – Panel on the Key Role of Heat Transfer Analysis in Energy Systems Research

Panel Presentation. IMECE2018-90048

Kashif Nawaz, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

10-18 K8-4 FUNDAMENTALS OF LIQUID/SOLID PHASE CHANGE (ICING/DEICING, SOLIDIFICATION)

10-18-1 K8-4 Fundamentals of Liquid/Solid Phase Change (Icing/Deicing, Solidification)

Third Floor, David L. Lawrence Convention Center, Room 331
3:45pm–5:30pm

Session Chair: Enakshi Wikramanayake, *University of Texas at Austin, Austin, TX, United States*

Session Co-Chair: Shalabh Maroo, *Syracuse University, Syracuse, NY, United States*

3:45pm – Extreme Icephobicity of Passive Anti-Icing Materials

Technical Presentation. IMECE2018-86360

Rukmava Chatterjee, *University of Illinois at Chicago, Chicago, IL, United States*, **Daniel Beysens**, *ESPCI PMMH, École Supérieure de Physique et de Chimie Industrielles, Paris, France*, **Sushant Anand**, *University of Illinois at Chicago, Chicago, IL, United States*

4:06pm – Exploration of Variable Conductance Effects During Input and Extraction of Heat From Phase Change Thermal Storage

Technical Paper Publication. IMECE2018-88078

Zachary Theroff, Dre Helmns, Van P. Carey, *University of California Berkeley, Berkeley, CA, United States*

4:27pm – Pore-Scale Modeling on Solidification of Paraffin With Volume Change in High Porosity Open-Cell Metal Foam

Technical Presentation. IMECE2018-88875

Yuanpeng Yao, Huiying Wu, *Shanghai Jiao Tong University, Shanghai, China*

4:48pm – Molecular Dynamics Simulations of Droplet Condensation on Nano-Structured Surfaces

Technical Presentation. IMECE2018-88981

Shalabh Maroo, Manish Gupta, *Syracuse University, Syracuse, NY, United States*, **M. Fernandino, C.A. Dorao**, *Norwegian University of Science and Technology, Trondheim, Norway*

10-26 K9-6 NANOSCALE RADIATION HEAT TRANSFER

10-26-2 Theoretical Prediction of Thermal Emission and Energy Conversion

Third Floor, David L. Lawrence Convention Center, Room 320
3:45pm–5:30pm

Session Chair: Sheng Shen, *Carnegie Mellon University, Pittsburgh, PA, United States*

Session Co-Chair: Sheila Edalatpour, *University of Maine, Orono, ME, United States*

3:45pm – Near-Field Thermal Emission by Periodic Arrays

Technical Presentation. IMECE2018-86335

Sheila Edalatpour, *University of Maine, Orono, ME, United States*

4:06pm – Dipolar Radiative Thermal Conductivity in Nanoparticle Arrays

Technical Presentation. IMECE2018-89069

Eric Tervo, Baratunde Cola, Zhuomin Zhang, *Georgia Institute of Technology, Atlanta, GA, United States*

4:27pm – Near-Field Thermophotonic Systems for Low-Grade Waste Heat Recovery

Technical Presentation. IMECE2018-86723

Bo Zhao, Parthiban Santhanam, Kaifeng Chen, Siddharth Buddhiraju, Shanhui Fan, *Stanford University, Stanford, CA, United States*

4:48pm – Quasi-Normal Mode Theory for Resonant Thermal Infrared Emitters in Near- and Far-Fields

Technical Presentation. IMECE2018-89227

Jiayu Li, Sheng Shen, Liu Baoan, *Carnegie Mellon University, Pittsburgh, PA, United States*

5:09pm – Directional and Narrow-Band Thermal Emission From Nanoantennas

Technical Presentation. IMECE2018-89391

Bowen Yu, Jiayu Li, Sheng Shen, *Carnegie Mellon University, Pittsburgh, PA, United States*

10-44 K18-1 THERMAL TRANSPORT UNDER HIGH TEMPERATURE AND/OR PRESSURE CONDITIONS

10-44-2 Thermal Transport Understanding and Its Applications

Third Floor, David L. Lawrence Convention Center, Room 333
3:45pm–5:30pm

Session Chair: **Qiuwang Wang**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

3:45pm – Tunable Thermal Transport and Reversible Thermal Conductivity Switching in Topologically Networked Bio-Inspired Materials

Technical Presentation. IMECE2018-89793

John A. Tomko, *University of Virginia, Charlottesville, VA, United States*, **Abdon Pena-Francesch, Huihun Jung**, *Pennsylvania State University, State College, PA, United States*, **Madhusudan Tyagi**, *National Institute of Standards, Gaithersburg, MD, United States*, **Benjamin Allen**, *Pennsylvania State University, State College, PA, United States*, **Melik Demirel**, *Pennsylvania State University, University Park, PA, United States*, **Patrick E. Hopkins**, *University of Virginia, Charlottesville, VA, United States*

4:06pm – Lattice Thermal Transport in Superhard Hexagonal Diamond and Wurtzite Boron Nitride Under High Temperature and/or High Pressure

Technical Presentation. IMECE2018-89714

Pranay Chakraborty, Guoping Xiong, Lei Cao, Yan Wang, *University of Nevada, Reno, Reno, NV, United States*

4:27pm – Numerical Simulation With LB Method for Propane Combustion Within Catalytic Micro-Porous Media Combustor

Technical Paper Publication. IMECE2018-86754

X.B. Feng, Zhiguo Qu, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

4:48pm – Fruit Ripeness Estimation for Avocado Using Thermal Imaging

Technical Paper Publication. IMECE2018-86290

Sathish Kumar Gurupatham, Nick Jacob, Kevin Van Der Horn, Fahad Fahad, Erhan Ilksoy, *Kennesaw State University, Marietta, GA, United States*

5:09pm – Incubation Phenomenon Induced by Multiple Femtosecond Laser Pulses Burst From a Single Pulse to Process Aluminum

Technical Paper Publication. IMECE2018-86960

Pengfei Ji, Mengzhe He, Yiming Rong, *Southern University of Science and Technology, Shenzhen, Guangdong, China*, **Yuwen Zhang**, *University of Missouri, Columbia, MO, United States*, **Yong Tang**, *South China University of Technology, Guangzhou, Guangdong, China*

THURSDAY, NOVEMBER 15

10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS

10-29-5 Thermal Engineering With Plasmonic Materials

Fourth Floor, David L. Lawrence Convention Center, Room 405
8:00am–8:45am

Session Chair: Sanjiv Sinha, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chairs: Edward Kinzel, *Missouri University of Science and Technology, Rolla, MO, United States*, Yu-bin Chen, *National Tsing Hua University, Hsinchu, Taiwan*

8:00am – Ultrathin Liquid Film Thickness Measurement Using Surface Plasmon Resonance Imaging

Technical Presentation. IMECE2018-89269

Iltai (Isaac) Kim, *Texas A&M University-Corpus Christi, Corpus Christi, TX, United States*

8:21am – Surface Plasmon Effects on the Interfacial Heat Transport Processes in Gold Nanorods

Technical Presentation. IMECE2018-89712

Andrew Kelliher, **John A. Tomko**, *University of Virginia, Charlottesville, VA, United States*, **Brian B. Lynch**, **Joseph B. Tracy**, *North Carolina State University, Raleigh, NC, United States*, **Patrick Hopkins**, *University of Virginia, Charlottesville, VA, United States*

8:42am – Optimization of External Quantum Efficiency of Thin Film Solar Cells Using Surrogate Modeling of Absorptivity

Technical Presentation. IMECE2018-89012

Mine Kaya, **Shima Hajimirza**, *Texas A&M University, College Station, TX, United States*

10-13 K7-1 MEASUREMENTS OF THERMOPHYSICAL PROPERTIES

10-13-1 Measurements of Thermophysical Properties

Third Floor, David L. Lawrence Convention Center, Room 326
8:55am–10:40am

Session Chair: Nicholas Roberts, *Utah State University, Logan, UT, United States*

8:55am – Picosecond Transient Thermoreflectance Technique for Measuring Thermal Conductivity in Thin Films

Technical Presentation. IMECE2018-87712

Jihoon Jeong, **Xianghai Meng**, **Jung-Fu Lin**, **Yaguo Wang**, *University of Texas at Austin, Austin, TX, United States*

9:16am – The Thermal Properties of Pristine and Loaded Metal Organic Framework Thin Films Under Different Environmental Conditions

Technical Presentation. IMECE2018-89240

Mallory E. DeCoster, *University of Virginia, Charlottesville, VA, United States*, **Hasan Babaei**, **University of Pittsburgh**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Minyoung Jeong**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Zeinab Hassan**, *Karlsruhe Institute of Technology, Baden-Wurttemberg, Baden-Wurttemberg, Germany*, **Timur Islamoglu**, *Northwestern University, Evanston, IL, United States*, **Christopher E. Wilmer**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Helmut Baumgart**, *Old Dominion University, Newport News, VA, United States*, **Jonathan Malen**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Engelbert Redel**, *Karlsruhe Institute of Technology, Baden-Wurttemberg, Baden-Wurttemberg, Germany*, **Patrick Hopkins**, *University of Virginia, Charlottesville, VA, United States*

9:37am – Thermal Transport in Electrospun Vinyl Polymer Nanofibers: Effects of Molecular Weight and Side Chain Groups

Technical Presentation. IMECE2018-89769

Yin Zhang, *Southeast University, Nanjing, China*, **Xin Zhang**, **Lin Yang**, **Qian Zhang**, **Matthew Fitzgerald**, *Vanderbilt University, Nashville, TN, United States*, **Akira Ueda**, *Fisk University, Nashville, TN, United States*, **Yunfei Chen**, *Southeast University, Nanjing, China*, **Richard Mu**, *Tennessee State University, Nashville, TN, United States*, **Deyu Li**, **Leon Bellan**, *Vanderbilt University, Nashville, TN, United States*

9:58am – Microstructural and Thermal Characterization of Diamond Nanofluids

Technical Paper Publication. IMECE2018-87496

Farzin Mashali, **Ethan Languri**, **Gholamreza Mirshekari**, *Tennessee Technological University, Cookeville, TN, United States*, **Jim Davidson**, **David Kerns**, *FemtoScience, Nashville, TN, United States*

10:19am – Evaluation of Heat Transfer Kinetics on Layers of Air-Rich Soft Materials in Their Natural State

Technical Paper Publication. IMECE2018-87268

Hiroki Kaneko, **Atsushi Sakuma**, *Kyoto Institute of Technology, Kyoto, Japan*

10-26 K9-6 NANOSCALE RADIATION HEAT TRANSFER

10-26-3 Radiative Properties and Radiative Transfer in the Far Field

Third Floor, David L. Lawrence Convention Center, Room 324
8:55am–10:40am

Session Chair: Liping Wang, *Arizona State University, Tempe, AZ, United States*

Session Co-Chair: Zhen Chen, *Southeast University, Nanjing, Jiangsu, China*

8:55am – Simultaneously and Synergistically Harvest Energy From the Sun and Outer Space

Technical Presentation. IMECE2018-86538

Zhen Chen, *Southeast University, Nanjing, Jiangsu, China*, **Linxiao Zhu**, *University of Michigan, Ann Arbor, MI, United States*, **Wei Li**, **Shanhui Fan**, *Stanford University, Stanford, CA, United States*

9:16am – Scalable Metal-Free Paint for Passive Radiative Cooling Under Direct Sunlight in Daytime and Nighttime

Technical Paper Publication. IMECE2018-88658

Xiangyu Li, *Purdue University, West Lafayette, IN, United States*, **Zhifeng Huang**, *Wuhan University, Wuhan, China*, **Joseph Peoples**, *Purdue University, West Lafayette, IN, United States*, **Jun Qiu**, *Harbin Institute of Technology, Harbin, China*, **Xiulin Ruan**, *Purdue University, West Lafayette, IN, United States*

9:37am – Hierarchical Approach of Nanoparticle Size Selection for Enhancing Reflectance of the Solar Irradiation

Technical Presentation. IMECE2018-89973

Joseph Peoples, **Xiangyu Li**, *Purdue University, West Lafayette, IN, United States*, **Yaobing Lv**, **Jun Qiu**, *Harbin Institute of Technology, Harbin, China*, **Zhifeng Huang**, *Wuhan University, Wuhan, China*, **Xiulin Ruan**, *Purdue University, West Lafayette, IN, United States*

9:58am – Thermochromic VO₂-Based Variable Emittance Coatings for Spacecraft Thermal Control

Technical Presentation. IMECE2018-89215

Sydney Taylor, **Liping Wang**, *Arizona State University, Tempe, AZ, United States*

10:19am – Hundred-Fold Enhancement in Far-Field Radiative Heat Transfer Over the Blackbody Limit

Technical Presentation. IMECE2018-89312

Dakotah Thompson, **Linxiao Zhu**, **Rohith Mittapally**, **Seid Sadat**, *University of Michigan, Ann Arbor, MI, United States*, **Zhen Xing**, **Patrick McArdle**, **Mumtaz Qazilbash**, *College of William and Mary, Williamsburg, VA, United States*, **Pramod Sangi Reddy**, **Edgar Meyhofer**, *University of Michigan, Ann Arbor, MI, United States*

10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS

10-29-2 Heat Transfer Devices and Engineering

Third Floor, David L. Lawrence Convention Center, Room 325
8:55am–10:40am

Session Chair: Sanjiv Sinha, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chair: Neil Zuckerman, *Seagate Technologies, Bloomington, MN, United States*

8:55am – Flow Characteristics of Nitrogen (N₂) in Micro-Channels of Printed Circuit Heat Exchanger (PCHE)

Technical Paper Publication. IMECE2018-86617

Jeong-Heon Shin, **Seok Ho Yoon**, **Jun Seok Choi**, *Korea Institute of Machinery & Materials, Daejeon, Korea (Republic)*

9:16am – Enhanced Heat Convection in Nanochannels Through Surface Engineering

Technical Presentation. IMECE2018-89827

Pranay Chakraborty, **Tengfei Ma**, **Yan Wang**, *University of Nevada, Reno, Reno, NV, United States*

9:37am – Simulation and Fabrication of Additively Manufactured Heat Pipes

Technical Presentation. IMECE2018-89839

Daniel Hsieh, **Oluseyi Babatola**, **Sanjiv Sinha**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

9:58am – Optimization of Heat Transfer Using Nano-Cutting Fluids

Technical Presentation. IMECE2018-89618

Ali Hussain Kazim, **Mariyam Shabbir**, **Faiza Mansoor**, **Sumaira Gulfam**, *University of Engineering and Technology, Lahore, Lahore, Punjab, Pakistan*

10:19am – Thermomechanical Design Optimization of Roll-to-Roll Manufactured Hybrid Metal-Polymer Heat Exchanger Pipes for Waste Heat Recovery

Technical Presentation. IMECE2018-89791

Manjunath Rajagopal, **Yuquan Meng**, **Timothy Man**, **Harikrishnan Kumar**, **Arpit Dwivedi**, **Dhruv Gelda**, **Chenhui Shao**, **Sanjiv Sinha**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10-47 K18-4 THERMAL ANALYSIS OF INDUSTRIAL EQUIPMENT AND SYSTEMS OPERATING UNDER EXTREME PROCESS CONDITIONS

10-47-1 Heat Transfer and Heat Exchange

Third Floor, David L. Lawrence Convention Center, Room 327
8:55am–10:40am

Session Chair: Qiuwang Wang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

8:55am – Performance Analysis of Multi-Pass Cross-Flow Heat Exchangers

Technical Paper Publication. IMECE2018-87049
Kiran Lankalapalli, Ahmed ElSawy, Stephen Idem, *Tennessee Technological University, Cookeville, TN, United States*

9:16am – The Cooling Process of Agricultural Products After Boxing and Palletizing

Technical Paper Publication. IMECE2018-87788
Aklilu Giorges, John Pierson, *Georgia Institute of Technology, Atlanta, GA, United States*

9:37am – Turbulent Multi-Jet Air Impingement for Applications in Commercial Cooking

Technical Paper Publication. IMECE2018-88635
Shantanu Shevade, *University of South Florida, Tampa, FL, United States*, **Muhammad Rahman,** *Wichita State University, Wichita, KS, United States*, **Rasim Guldiken,** *University of South Florida, Tampa, FL, United States*

9:58am – Heat Transfer Aspect of a Counter-Current Two Phase Flow System for Harvesting Natural Gas From Seafloor Hydrates

Technical Presentation. IMECE2018-88853
Boyun Guo, *University of Louisiana, Lafayette, LA, United States*

10:19am – Experimental Comparison of 50 kW and 200 kW Printed Circuit Heat Exchangers (PCHE)

Technical Presentation. IMECE2018-89521
Jeong-Heon Shin, *Korea Institute of Machinery and Materials, Daejeon, Daejeon, Korea (Republic)*, **Joo Ha Ahn,** *TankTech, Busan, Korea (Republic)*, **Jungchul Kim, Sangho Sohn, Seok Ho Yoon,** *Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

10-63 K10-4 MULTI-PHASE AND PASSIVE ENHANCED HEAT TRANSFER

10-63-2 Multi-Phase and Passive Enhanced Heat Transfer

Third Floor, David L. Lawrence Convention Center, Room 321
8:55am–10:40am

Session Chair: Amanie Abdelmessih, *California Baptist University, Diamond Bar, CA, United States*

Session Co-Chair: Ahmed Elatar, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

8:55am – Enhanced Heat Transfer in Radial Heat Sinks for LED Lamps

Technical Paper Publication. IMECE2018-87958
Fernando Cano-Banda, *University of Guanajuato, Irapuato Guanajuato, Guanajuato, Mexico*, **Ana Gallardo-Gutierrez,** **Luis Luviano-Ortiz, Abel Hernandez-Guerrero,** *University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico*, **Jesus Garcia-Gonzalez,** *Grupo SSC, San Miguel de Allende, Guanajuato, Mexico*

9:16am – Influence of Pattern Geometry of Hybrid Surfaces on Dropwise Condensation Heat Transfer and Droplet Dynamics

Technical Paper Publication. IMECE2018-88571
Karim Egab, *University of Mazaya, Nassiriyah, Nassiriyah, Iraq*, **Saad Oudah, Mohammad Alwazzan, Jamil Khan, Chen Li,** *University of South Carolina, Columbia, SC, United States*

9:37am – Effects of Surface Microstructure Parameters on Spray Cooling Efficiency

Technical Presentation. IMECE2018-89510
Sankarganesh Muthukrishnan, *University of Minnesota Twin Cities, Minneapolis, MN, United States*, **Vinod Srinivasan,** *UMN, Minneapolis, MN, United States*

9:58am – Direct Numerical Simulation of Evaporating Meniscus in Capillary Channel

Technical Presentation. IMECE2018-89931
Mohammad Naghashnejad, Hamidreza Shabgard, *University of Oklahoma, Norman, OK, United States*

10-14 K7-2 COMPUTATIONS OF THERMOPHYSICAL PROPERTIES

10-14-1 Calculations of Thermophysical Properties 1
Third Floor, David L. Lawrence Convention Center, Room 326
10:50am–12:35pm

Session Chair: Nicholas Roberts, *Utah State University, Logan, UT, United States*

10:50am – The Effects of Neutron Irradiation Damage on the Lattice Thermal Conductivity of Beta-Silicon Carbide
Technical Presentation. IMECE2018-87896

William Yorgason, Arden Barnes, Nicholas Roberts, Utah State University, Logan, UT, United States

11:11am – Effective Electronics Cooling Through Microchannel Heat Sink (MCHS) Applications

Technical Presentation. IMECE2018-88802
Sonya Smith, Darryl Jennings, Jr., Howard University, Washington, DC, United States

11:32am – A Reliable Approach to Calculation of Thermophysical Properties of Liquid Using Molecular Dynamics Simulations

Technical Presentation. IMECE2018-88837
Seyed Aliakbar Mirmohammadi, University of Sydney, Sydney, New South Wales, Australia

11:53am – Tunable Thermal Conductivity of Two-Dimensional Polymers

Technical Presentation. IMECE2018-89117
Hao Ma, Erica O'Donnel, Zhiting Tian, Virginia Tech, Blacksburg, VA, United States

12:14pm – Evaluating the Accuracy of Neural Network Potential for Thermal Transport Properties of Silicon
Technical Presentation. IMECE2018-89487

Hasan Babaei, University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States, Sangyeop Lee, University of Pittsburgh, Pittsburgh, PA, United States

10-27 K9-7 ADVANCES IN METROLOGY

10-27-1 Thermal Metrology for Nanoscale Heat Transfer

Third Floor, David L. Lawrence Convention Center, Room 324
10:50am–12:35pm

Session Chair: Yongjie Hu, *University of California, Los Angeles, Los Angeles, CA, United States*

Session Co-Chair: Sanjiv Sinha, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10:50am – Nanoscale Thermal Metrology Using Electrons and Photons

Invited Presentation. IMECE2018-89876
Chris Dames, UC Berkeley, Berkeley, CA, United States

11:32am – A Multi-Frequency 3 Omega Method for Tracking Moving Phase Boundaries in Real Time

Technical Presentation. IMECE2018-89632
Wyatt Hodges, Chris Dames, UC Berkeley, Berkeley, CA, United States

11:53am – Reflection of Gigahertz Acoustic Phonons in Silicon at a Nanowire-Bulk Interface

Technical Presentation. IMECE2018-89743
Dhruv Gelda, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Marc Ghossoub, Intel, Hillsboro, OR, United States, Manjunath Rajagopal, Sanjiv Sinha, University of Illinois at Urbana-Champaign, Urbana, IL, United States

12:14pm – A New Experimental Metrology Based on Asymmetric Time-Domain Thermoreflectance Method for Anisotropic Thermal Conductivity Measurement

Technical Presentation. IMECE2018-86052
Man Li, Joon Sang Kang, Yongjie Hu, University of California, Los Angeles, Los Angeles, CA, United States

10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS

10-29-3 Transport at Interfaces

Third Floor, David L. Lawrence Convention Center, Room 323
10:50am–12:35pm

Session Chair: Sanjiv Sinha, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chair: Yan Wang, *University of Nevada, Reno, Reno, NV, United States*

10:50am – Phonon-Mediated Thermal Transport at Bridged Solid-Solid Interfaces

Technical Presentation. IMECE2018-88883
Rouzbeh Rastgar, Jingjie Zhang, University of Virginia, Charlottesville, VA, United States, Carlos Polanco, Oak Ridge National Laboratory, Oak Ridge, TN, United States, Nam Q. Le, NRL, Washington, DC, United States, Avik W. Ghosh, Pamela M. Norris, University of Virginia, Charlottesville, VA, United States

11:11am – The Impact of Interdiffusion of Metal Adhesion Layers on Thermal Interface Conductance

Technical Presentation. IMECE2018-86379

Dipanjan Saha, Xiaoxiao Yu, Minyoung Jeong, Mohamed Darwish, Carnegie Mellon University, Pittsburgh, PA, United States, **Jeffrey Weldon**, University of Hawaii, Honolulu, HI, United States, **Andrew Gellman**, **Jonathan Malen**, Carnegie Mellon University, Pittsburgh, PA, United States

11:32am – Non-Equilibrium and Non-Diffusive Phonon Transport Near Al/GaN Interface

Technical Presentation. IMECE2018-87185

Xin Qian, University of Colorado Boulder, Boulder, CO, United States, **Xiaokun Gu**, Shanghai Jiao Tong University, Shanghai, China, **Puqing Jiang**, **Ronggui Yang**, University of Colorado Boulder, Boulder, CO, United States

11:53am – The Influence of Titanium Adhesion Layer Oxygen Stoichiometry on Thermal Boundary Conductance at Gold Contacts

Technical Presentation. IMECE2018-89135

David Olson, **Keren M. Freedy**, **Patrick Hopkins**, **Stephen J. McDonnell**, University of Virginia, Charlottesville, VA, United States

12:14pm – Spatial Mapping and Analysis of Thermal Boundary Conductance of Metal-MoSe₂ Interfaces Using Time-Domain Thermoreflectance

Technical Presentation. IMECE2018-89746

David B. Brown, Georgia Institute of Technology, Atlanta, GA, United States, **Xufan Li**, **Kai Xiao**, **David B. Geohegan**, Oak Ridge National Laboratory, Oak Ridge, TN, United States, **Satish Kumar**, Georgia Institute of Technology, Atlanta, GA, United States

10-29-4 Thermal Conductivity

Fourth Floor, David L. Lawrence Convention Center, Room 405
10:50am–12:14pm

Session Chair: Sanjiv Sinha, University of Illinois at Urbana-Champaign, Urbana, IL, United States

Session Co-Chair: Yee Kan Koh, National University of Singapore, Singapore, Singapore

10:50am – Effect of Loading the MOF HKUST-1 With Water, Methanol and Ethanol on Its Thermal Conductivity

Invited Presentation. IMECE2018-88286

Hasan Babaei, University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States, **Minyoung Jeong**, **Jonathan Malen**, Carnegie Mellon University, Pittsburgh, PA, United States, **Christopher E. Wilmer**, University of Pittsburgh, Pittsburgh, PA, United States

11:32am – Thermal Conductivity of ALD Grown PbTe/PbSe Superlattice Thin Films

Technical Presentation. IMECE2018-89249

Mallory E. DeCoster, University of Virginia, Charlottesville, VA, United States, **Xin Chen**, **Kai Zhang**, **Helmut Baumgart**, Old Dominion University, Newport News, VA, United States, **Patrick Hopkins**, University of Virginia, Charlottesville, VA, United States

11:53am – TX-100 Capped Iron Oxide Nanoparticle Transformation and Implications for Induction Heating and Hyperthermia Treatment

Technical Presentation. IMECE2018-87556

Hayden Carlton, **David Huitink**, University of Arkansas, Fayetteville, AR, United States

12:14pm – Thermal Conductivity of Poly (3,4-ethylenedioxythiophene) Films Engineered by Oxidative Chemical Vapor Deposition (oCVD)

Technical Presentation. IMECE2018-89324

Phil M. Smith, **Laisuo Su**, **Wei Gong**, **Nathan Nakamura**, **B. Reeja-Jayan**, **Sheng Shen**, Carnegie Mellon University, Pittsburgh, PA, United States

10-30 K10-1 SINGLE-PHASE ENHANCED HEAT TRANSFER – NUMERICAL STUDIES

10-30-2 Single-Phase Enhanced Heat Transfer: Numerical Studies – I

Fourth Floor, David L. Lawrence Convention Center, Room 406
10:50am–12:35pm

Session Chair: Maulik Shelat, Praxair, Williamsville, NY, United States

Session Co-Chair: Ahmed Elatar, Oak Ridge National Laboratory, Oak Ridge, TN, United States

10:50am – Heat Transfer Analyses of a 3D Graphene-Carbon Nanotube Pillared Structure

Technical Paper Publication. IMECE2018-87029

Khaled Almahmoud, **Weihuan Zhao**, University of North Texas, Denton, TX, United States

11:11am – Shape Optimization of Microchannels Using Surrogate Modelling

Technical Paper Publication. IMECE2018-87780

Muhammad Ansab Ali, **Tariq Saeed Khan**, The Petroleum Institute, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir., **Saqib Salam**, **Ebrahim Al-Hajri**, Petroleum Institute of Abu Dhabi, Abu Dhabi, United Arab Emir.

11:32am – Effect of Inter-Connector on Thermo-Hydraulic Characteristics of Parallel and Counter Flow Mini-Channel Heat Sink

Technical Paper Publication. IMECE2018-88273

Amitav Tikadar, **Saad Oudah**, University of South Carolina, Columbia, SC, United States, **Azzam Salman**, University of South Carolina, West Columbia, SC, United States, **A.K.M. Monjur Morshed**, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, **Titan Paul**, University of South Carolina Aiken, Aiken, SC, United States, **Jamil Khan**, University of South Carolina, Columbia, SC, United States

11:53am – Heat Transfer Enhancement in Minichannel Flow**Technical Paper Publication. IMECE2018-88539**

Luis Serrano, *Universidad del Turabo, Villalba, PR, United States*, **Jose G. Pedro**, *Universidad del Turabo, Canovanas, PR, United States*, **Jahian Rodríguez**, *Universidad del Turabo, Cidra, PR, United States*, **Gerardo Carbajal**, *Universidad del Turabo, Caguas, PR, United States*

10-14 K7-2 COMPUTATIONS OF THERMOPHYSICAL PROPERTIES**10-14-2 Calculations of Thermophysical Properties 2**

Third Floor, David L. Lawrence Convention Center, Room 326
2:05pm–3:50pm

Session Chair: Nicholas Roberts, *Utah State University, Logan, UT, United States*

2:05pm – One, Two, and Three-Dimensional Crossover of the Thermal Transport in ZrTe₅**Technical Presentation. IMECE2018-86753**

Tianli Feng, Sokrates Pantelides, *Vanderbilt University, Nashville, TN, United States*

2:26pm – Thermal Characterization of Carbon Nanofiber Structures Based on Their Aspect Ratio**Technical Presentation. IMECE2018-87558**

Amir Behbahanian, Nicholas Roberts, *Utah State University, Logan, UT, United States*

2:47pm – Computation of Thermophysical Properties of Jet Impingement Heat Transfer**Technical Presentation. IMECE2018-89519**

Anuj Kumar Shukla, Anupam Dewan, *Indian Institute of Technology, Delhi, New Delhi, Delhi, India*

3:08pm – Giant Reduction of Thermal Transport in Polyvinylidene Fluoride Under Tensile Strains**Technical Presentation. IMECE2018-89789**

Tengfei Ma, Lei Cao, Yan Wang, *University of Nevada, Reno, Reno, NV, United States*

3:29pm – Anomalously Temperature-Dependent Thermal Conductivity of Monolayer GaN With Large Deviations From the Traditional 1/T Law**Technical Presentation. IMECE2018-89008**

Guangzhao Qin, *University of South Carolina, Columbia, SC, United States*, **Zhenzhen Qin**, *Zhengzhou University, Zhengzhou, Henan, China*, **Huimin Wang**, *Northeastern University, Shenyang, Liaoning, China*, **Ming Hu**, *University of South Carolina, Columbia, SC, United States*

10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS**10-29-1 Heat Conduction in 2D Materials/Devices**

Third Floor, David L. Lawrence Convention Center, Room 324
2:05pm–3:50pm

Session Chair: Sanjiv Sinha, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chairs: Yaguo Wang, *University of Texas, Austin, TX, United States*, Michael Pettes, *LANL MPA-CINT, Albuquerque, NM, United States*

2:05pm – Phonon Hydrodynamic Viscosity in Suspended Graphene**Technical Presentation. IMECE2018-89594**

Xun Li, Sangyeop Lee, *University of Pittsburgh, Pittsburgh, PA, United States*

2:26pm – Crossover of Phonon Transport Regimes in Suspended Graphene**Technical Presentation. IMECE2018-89595**

Xun Li, Sangyeop Lee, *University of Pittsburgh, Pittsburgh, PA, United States*

2:47pm – Exploring Nanoscale Heat Transport in Emerging High Thermal Conductivity Materials for Advanced Thermal Management**Technical Presentation. IMECE2018-86051**

Joon Sang Kang, Huan Wu, Man Li, Yongjie Hu, *University of California, Los Angeles, Los Angeles, CA, United States*

3:08pm – Nanoscale Heat Transfer and Phonon Spectral Mapping in Novel 2D Materials for Thermal Regulation and Energy Harvesting**Technical Presentation. IMECE2018-86054**

Joon Sang Kang, Man Li, Ming Ke, Yongjie Hu, *University of California, Los Angeles, Los Angeles, CA, United States*

3:29pm – Two-Dimensional Heat Transfer Considerations for Thermoreflectance Measurements**Technical Paper Publication. IMECE2018-88657**

Dipta Sarkar, Partha P. Chakraborty, B. Terry Beck, Zayd Leseman, *Kansas State University, Manhattan, KS, United States*

10-30 K10-1 SINGLE-PHASE ENHANCED HEAT TRANSFER—NUMERICAL STUDIES

10-30-1 Single-Phase Enhanced Heat Transfer: Numerical Studies II

Fourth Floor, David L. Lawrence Convention Center, Room 406
2:05pm–3:50pm

Session Chair: Maulik Shelat, *Praxair, Williamsville, NY, United States*

2:05pm – An Eight-Passage Serpentine Design for Negating Coriolis Force Effect on Heat Transfer

Technical Paper Publication. IMECE2018-86354
Prashant Singh, Srinath Ekkad, *North Carolina State University, Raleigh, NC, United States*

2:26pm – High Porosity and High Pore Density Thin Copper Foams for Compact Electronics Cooling

Technical Paper Publication. IMECE2018-86355
Sanskar Panse, Prashant Singh, Srinath Ekkad, *North Carolina State University, Raleigh, NC, United States*

2:47pm – Thermohydraulic Effect of Aspect Ratio on Combination Angled Dimpled in a Rectangular Channel

Technical Paper Publication. IMECE2018-86558
Samson A. Aasa, *University of Johannesburg, Johannesburg, Gauteng, South Africa*, Tien-Chien Jen, *University of Johannesburg, Johannesburg, South Africa*

3:08pm – A Numerical Analysis of Heat Transfer Enhancement by Turbulence Generated From Swirl Flow by Twisted Tape

Technical Paper Publication. IMECE2018-86616
Muhammad Azmain Abdullah, *City University, Dhaka, Dhaka, Bangladesh*, M. Ruhul Amin, *Montana State University, Bozeman, MT, United States*, Mohammad Ali, *Bangladesh University of Engineering and Technology, Dhaka, Bangladesh*

10-50 K19-3 HEAT TRANSFER IN HVAC SYSTEMS AND AIR QUALITY AND COMFORT IN CONFINED SPACES

10-50-1 Heat Transfer in HVAC Systems and Air Quality and Comfort in Confined Spaces

Third Floor, David L. Lawrence Convention Center, Room 325
2:05pm–3:50pm

Session Chair: Kashif Nawaz, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

Session Co-ChairS: S.A. Sherif, *University of Florida, Gainesville, FL, United States*, Michael Pate, *Texas A&M University, College Station, TX, United States*

2:05pm – Cooling Systems for Refuge Alternatives in Hot Mine Conditions

Technical Paper Publication. IMECE2018-87507
Lincan Yan, David Yantek, Miguel Reyes, Nicholas Damiano, Justin Srednicki, Joseph Bickson, Bruce Whisner, *CDC/NIOSH, Pittsburgh, PA, United States*, Eric Bauer, *BCS Life Support LLC, Titusville, FL, United States*

2:26pm – An Embedded Mechatronic Device for Real-Time Monitoring and Prediction of Occupants—Thermal Comfort

Technical Paper Publication. IMECE2018-87632
Boris Pavlin, Giovanni Carabin, Giovanni Pernigotto, Renato Vidoni, Andrea Gasparella, *Free University of Bolzano, Bolzano, Italy*

2:47pm – Net-Zero Water (NZW) Reuse Desiccant Assisted Evaporative Cooling System for Data Centers

Technical Presentation. IMECE2018-89738
David Okposio, *Purdue University Northwest, Hammond, IN, United States*, A.G. Agwu Nnanna, *University of Texas of the Permian Basin, Odessa, TX, United States*

3:08pm – Sublimating Paradichlorobenzene Spheres in a Natural Convection Environment

Technical Presentation. IMECE2018-86427
William S. Janna, *University of Memphis, Memphis, TN, United States*, Willi P. Anderson, *University of Tennessee Knoxville, Knoxville, TN, United States*, Jeffrey G. Marchetta, William Janna, *University of Memphis, Memphis, TN, United States*

3:29pm – Thermal Properties of a Concrete Aerogel Paste Composite

Technical Paper Publication. IMECE2018-88660
Chris Kobus, J. David Schall, *Oakland University, Rochester, MI, United States*

10-61 K8-7 FUNDAMENTALS OF BOILING AND CONDENSATION – II

10-61-1 K8-7 Fundamentals of Boiling and Condensation – II-B

Third Floor, David L. Lawrence Convention Center, Room 323
2:05pm–3:50pm

Session Chair: Sajjad Bigham, *Michigan Technological University, Houghton, MI, United States*

Session Co-Chair: Enakshi Wikramanayake, *University of Texas at Austin, Austin, TX, United States*

2:05pm – Theoretical Analysis of Moisture Condensation on a Cold Heat Sink

Technical Paper Publication. IMECE2018-86228
Run Yan, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

2:26pm – Membranes for Microscale Phase Separation of Completely Wetting Liquids

Technical Presentation. IMECE2018-88296
Mojtaba Hosseinnia, Sajjad Bigham, *Michigan Technological University, Houghton, MI, United States*

2:47pm – Sucking-Flow Condensation Heat Transfer on Hierarchical Structured Surfaces

Technical Presentation. IMECE2018-87265
Rongfu Wen, Yung-Cheng Lee, Ronggui Yang, *University of Colorado Boulder, Boulder, CO, United States*

3:08pm – Critical Radius of Bubble Nucleation in Pool Boiling

Technical Presentation. IMECE2018-88972

Manish Gupta, Shalabh Maroo, Syracuse University, Syracuse, NY, United States

10-62 K10-3 SINGLE-PHASE ENHANCED HEAT TRANSFER—APPLICATIONS AND EXPERIMENTS**10-62-1 Single-Phase Enhanced Heat Transfer—Applications**

Third Floor, David L. Lawrence Convention Center, Room 327
2:05pm–3:50pm

Session Chair: Mark Kedzierski, NIST, Gaithersburg, MD, United States

Session Co-Chairs: Kashif Nawaz, Oak Ridge National Laboratory, Oak Ridge, TN, United States, Yaroslav Chudnovsky, Gas Technology Institute, Des Plaines, IL, United States

2:05pm – Heat Transfer Augmentation From Extended Surface Using Dimples

Technical Paper Publication. IMECE2018-87345

Jay Mehta, Fay Nicole Colah, Anurag Rao, Vineeta Pendse, University of Mumbai, Mumbai, Maharashtra, India, Vyankatesh Bagal, Dwarkadas J. Sanghvi College of Engineering, Mumbai, Maharashtra, India, Kevin Ajmera, University of Mumbai, Mumbai, Maharashtra, India

2:26pm – An Experimental and Numerical Study of Heat Transfer and Flow Characteristics of Laminar Flow in a Circular Tube With Wedge-Shaped Wavy-Tape Inserts

Technical Paper Publication. IMECE2018-88335

Yunmin Liang, Peng Liu, Nianben Zheng, Feng Shan, Zhichun Liu, Wei Liu, Huazhong University of Science & Technology, China, Wuhan, China

2:47pm – Heat Transfer by a Rotating Liquid Jet Impingement Cooling System

Technical Paper Publication. IMECE2018-88377

Qi Lu, Sivapathas Parameswaran, Beibei Ren, Texas Tech University, Lubbock, TX, United States

3:08pm – Waterblock Modelling for GPU Liquid Cooling

Technical Paper Publication. IMECE2018-88567

Jose-Carlos Vargas-Vazquez, Jose-Angel Gutierrez-Garcia, Luis Luviano-Ortiz, Abel Hernandez-Guerrero, University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico, Jose-Luis Zuñiga-Cerroblando, Juventino Rosas Polytechnic University, Guanajuato, Aguascalientes, Mexico

3:29pm – Correlating Friction Factors and Nusselt Numbers for Laminar Simultaneously Developing Flow in Rectangular Plain Plate-Fin Channels

Technical Presentation. IMECE2018-89137

Kuan-Ting Lin, Dantong Shi, Milind Jog, Raj M. Manglik, University of Cincinnati, Cincinnati, OH, United States

10-1 GENERAL**10-1-1 Analysis of Thermal Systems**

Third Floor, David L. Lawrence Convention Center, Room 325
4:00pm–5:45pm

Session Chair: Kevin Dowding, Sandia National Laboratories, Albuquerque, NM, United States

4:00pm – CFD Modelling of Counter-Current Packed Bed for HDH Desalination System

Technical Presentation. IMECE2018-89749

Clement Roy, James Klausner, Andre Benard, Sina Jahangirimamouri, Michigan State University, East Lansing, MI, United States

4:21pm – Experimental Investigation of Heat/Mass Transfer and Pressure Drop in a Multi-String Humidifier

Technical Presentation. IMECE2018-89274

ZeZhi Zeng, Abolfazl Sadeghpour, Y. Sungtaek Ju, University of California, Los Angeles, Los Angeles, CA, United States

4:42pm – Measurement of Heat Transfer Coefficient in Interaction Zone of Multiple Liquid Jet Impingements

Technical Presentation. IMECE2018-89186

Chaitanya Ghodake, Bharat Forge, Pune, Maharashtra, India

5:03pm – Numerical Study of Forced Convection in Different Fluids From Stationary Heated Cylinders in a Square Enclosure

Technical Paper Publication. IMECE2018-87032

Srishti Mishra, Mukul Tomar, Adeel Ahmad, Satvik Jain, Naveen Kumar, Delhi Technological University, Delhi, India

10-28 K9-8 ADVANCES IN SIMULATION METHODS**10-28-1 K9-8 Advances in Simulation Methods**

Third Floor, David L. Lawrence Convention Center, Room 324
4:00pm–5:45pm

Session Chair: Dong Liu, University of Houston, Houston, TX, United States

4:00pm – Prediction of Four-Phonon Scattering and Related Thermal Properties

Invited Presentation. IMECE2018-89439

Tianli Feng, Purdue University, West Lafayette, IN, United States, Lucas Lindsay, Oak Ridge National Lab, Oak Ridge, TN, United States, Xiulin Ruan, Purdue University, West Lafayette, IN, United States

4:42pm – Mapping of Phonon Modes Between Two-Dimensional and Three-Dimensional Systems

Technical Presentation. IMECE2018-86938

Hyun-Young Kim, Alan McGaughey, Carnegie Mellon University, Pittsburgh, PA, United States

5:03pm – Quantifying Uncertainty in First-Principles Predictions of Phonon Dispersion Relations

Technical Presentation. IMECE2018-89140

Holden Parks, Venkat Viswanathan, Alan McGaughey, Carnegie Mellon University, Pittsburgh, PA, United States

5:24pm – Determining Influential Descriptors for Polymer Chain Conformation Based on Empirical Force-Fields and Molecular Dynamics Simulations

Technical Presentation. IMECE2018-86305

Ruimin Ma, Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States

10-30 K10-1 SINGLE-PHASE ENHANCED HEAT TRANSFER—NUMERICAL STUDIES

10-30-3 Single-Phase Enhanced Heat Transfer: Numerical Studies – III

Fourth Floor, David L. Lawrence Convention Center, Room 406
4:00pm–5:45pm

Session Chair: Sandra Boetcher, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States

4:00pm – Three-Tier Impingement Cooling Design for Gas Turbine Blade Trailing Edge

Technical Paper Publication. IMECE2018-86430

Kishore Ranganath Ramakrishnan, Prashant Singh, Srinath Ekkad, North Carolina State University, Raleigh, NC, United States

4:21pm – Experimental Investigation of Heat Transfer Enhancement Through Array Jet Impingement on Various Configurations of High Porosity Thin Metal Foams

Technical Paper Publication. IMECE2018-86432

Srivatsan Madhavan, Prashant Singh, Srinath Ekkad, North Carolina State University, Raleigh, NC, United States

4:42pm – Heat Dissipator With Aztec Inspired Radial Geometry

Technical Paper Publication. IMECE2018-88570

Alheli Perez-Hernandez, Luis Luviano-Ortiz, Abel Hernandez-Guerrero, University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico, Israel Botello-Arredondo, Universidad Autónoma de Ciudad Juárez, Ciudad Juárez, Chihuahua, Mexico

10-61 K8-7 FUNDAMENTALS OF BOILING AND CONDENSATION – II

10-61-2 K8-7 Fundamentals of Condensation, Transient Boiling, and Dehumidification

Third Floor, David L. Lawrence Convention Center, Room 323
4:00pm–5:45pm

Session Chair: Alexander Rattner, Pennsylvania State University, University Park, PA, United States

Session Co-Chair: Enakshi Wikramanayake, University of Texas at Austin, Austin, TX, United States

4:00pm – Heat Transfer During Condensing Droplet Coalescence

Technical Presentation. IMECE2018-87618

Sanjay Adhikari, Alexander Rattner, Pennsylvania State University, University Park, PA, United States

4:21pm – Cavitation Corrosions in Capillary Pulsating Heat Pipe

Technical Paper Publication. IMECE2018-88088

Steve Cai, Independent Author, Manlius, NY, United States

4:42pm – Development of In-Water, Transient Boiling Detector

Technical Presentation. IMECE2018-88932

Ezekiel Villarreal, University of Pittsburgh, Pittsburgh, PA, United States, Austin Fleming, Eric D. Larsen, Colby Jensen, Idaho National Laboratory, Idaho Falls, ID, United States, Heng Ban, University of Pittsburgh, Pittsburgh, PA, United States

5:03pm – Sodium Pumping via Condensation Within a Non-Wetting Porous Structure

Technical Presentation. IMECE2018-89197

Alexander Limia, Peter Kottke, Ritesh Bhatt, Andrei G. Fedorov, Shannon K. Yee, Georgia Institute of Technology, Atlanta, GA, United States

5:24pm – Multi-String Dehumidifier, an Experimental Study

Technical Presentation. IMECE2018-89491

Abolfazl Sadeghpour, Zezhi Zeng, Y. Sungtaek Ju, University of California, Los Angeles, Los Angeles, CA, United States

5:45pm – Reducing Contact Time of a Bouncing Drop in Janus State

Technical Presentation. IMECE2018-87279

Chu-Yao Chou, Venkataraman Sahoo, Ching-Wen Lo, Ming-Chang Lu, National Chiao Tung University, Hsinchu, Taiwan

10-63 K10-4 MULTI-PHASE AND PASSIVE ENHANCED HEAT TRANSFER

10-63-1 Multi-Phase and Passive Enhanced Heat Transfer

Third Floor, David L. Lawrence Convention Center, Room 327
4:00pm–5:45pm

Session Chair: Kashif Nawaz, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

4:00pm – Natural Convection Heat Transfer With Horizontal Rectangular Fin Array Using Straight Knurling Patterns on Fins: An Experimental Study

Technical Paper Publication. IMECE2018-86449
Rahul Chikurde, Basavraj Kothavale, Maer's - MIT COE, Pune, Maharashtra, India, Narayan Sane, Walchand College of Engineering, Sangli, India

4:21pm – Numerical Study of Microencapsulated Phase Change Material Slurries

Technical Presentation. IMECE2018-86681
Jonathan Young, Western New England University, Ludlow, MA, United States, Anthony Santamaria, Jingru Benner, Western New England University, Springfield, MA, United States

4:42pm – Natural Convection in a Square Cavity Utilizing Different Nanofluids in Presence of Constant Magnetic Field With Brownian Motion Effect

Technical Paper Publication. IMECE2018-87123
Misarah Abdelaziz, Wael El-Maghlany, Ashraf S. Ismail, Alexandria University, Alexandria, Egypt

5:03pm – Pool Boiling Heat Transfer Enhancement of Water by Gold Nanoparticles With an Electrophoretic Deposition Method

Technical Paper Publication. IMECE2018-87356
Zhen Cao, Anh Duc Pham, Zan Wu, Lund University, Lund, Sweden, Tautgirdas Ruzgas, Cathrine Albèr, Malmö University, Malmö, Sweden, Bengt Sunden, Lund University, Lund, Sweden

5:24pm – Experimental Study of Convective Heat Transfer in Standard and Cross-Drilled Brake Discs With Radial Vane and X-Lattice Cores

Technical Paper Publication. IMECE2018-86195
Hongbin Yan, Northwestern Polytechnical University, Xi'an, China, Shangsheng Feng, Xi'an Jiaotong University, Xi'an, China, Wei-Tao Wu, Nanjing University of Science and Technology, Nanjing, China, Tian Jian Lu, Xi'an Jiaotong University, Xi'an, China, Gongnan Xie, Northwestern Polytechnical University, Xi'an, China

TRACK II MATERIALS: GENETICS TO STRUCTURES

- 11-2-1: Nanomaterials for Energy I
- 11-2-2: Nanomaterials for Energy II
- 11-4-1: Materials and 3D Printing for Biology and Medicine
- 11-6-1: Nanoengineered, Hierarchical, Multi-Scale Materials and Structures
- 11-7-1: Fracture and Damage: Nano- to Macro-Scale I
- 11-7-2: Fracture and Damage: Nano- to Macro-Scale II
- 11-8-1: Material Processing of Flexible Electronics, Sensors, and Devices I
- 11-8-2: Material Processing of Flexible Electronics, Sensors, and Devices II
- 11-8-3: Material Processing of Flexible Electronics, Sensors, and Devices III
- 11-8-4: Material Processing of Flexible Electronics, Sensors, and Devices IV
- 11-8-5: Material Processing of Flexible Electronics, Sensors, and Devices V
- 11-9-1: Materials Processing and Characterization I
- 11-9-2: Materials Processing and Characterization II
- 11-9-3: Materials Processing and Characterization III
- 11-9-4: Materials Processing and Characterization IV
- 11-9-5: Materials Processing and Characterization V
- 11-9-6: Materials Processing and Characterization VI
- 11-10-1: Bioinspired Composites and Structures
- 11-10-2: Bioinspired Materials, Structures and Applications
- 11-11-1: Modeling, Simulation and Design of Multifunctional Materials 1
- 11-11-2: Modeling, Simulation and Design of Multifunctional Materials 2
- 11-12-1: Mechanics in Manufacturing of Multifunctional Materials and Structures I
- 11-12-2: Mechanics in Manufacturing of Multifunctional Materials and Structures II
- 11-13-1: Multiphysics and Multiscale Modeling of Lithium-Ion Batteries
- 11-14-1: Multifunctional Composite Materials and Structures 1
- 11-14-2: Multifunctional Composite Materials and Structures 2
- 11-14-3: Multifunctional Composite Materials and Structures 3
- 11-14-4: Multifunctional Composite Materials and Structures 4
- 11-15-1: Multifunctional Nanomaterials 1
- 11-15-2: Multifunctional Nanomaterials 2
- 11-18-1: Phase Transformations in Materials Processing I: Additive Manufacturing
- 11-18-2: Phase Transformations in Materials Processing II: Microstructures and Properties
- 11-20-1: Recent Developments in Tribology
- 11-23-1: Materials: Genetics to Structures Plenary I
- 11-23-2: Materials: Genetics to Structures Plenary II

ACKNOWLEDGMENT

Track Organizers

Toshio Nakamura, *SUNY at Stony Brook, United States*
 Markus Buehler, *MIT, United States*

Topic Organizers

Hanqing Jiang, *Arizona State University, United States*
 Arunkumar Subramanian, *University of Illinois at Chicago, United States*
 Michael Pettes, *University of Connecticut, United States*
 Lijie Grace Zhang, *George Washington University, United States*
 Shida Miao, *George Washington University, United States*
 Ram Mohan, *North Carolina A & T University, United States*
 Wayne Hodo, *US Army – ERDC, United States*
 Raghu Prakash, *Indian Institute of Technology Madras, India*
 Vikram Jayaram, *Indian Institute of Science, India*
 Ashok Saxena, *University of Arkansas, United States*
 Aaron Mazzeo, *Rutgers, The State University of New Jersey, United States*
 Qiming Wang, *University of Southern California, United States*
 Jianliang Xiao, *University of Colorado Boulder, United States*
 Woon-Hong Yeo, *Georgia Institute of Technology, United States*
 Yuris Dzenis, *University of Nebraska, United States*
 Cunjiang Yu, *University of Houston, United States*
 Sridhar Santhanam, *Villanova University, United States*
 Seyed Allameh, *Northern Kentucky University, United States*
 Zhenhai Xia, *University of North Texas, United States*
 Travis Shihao Hu, *California State University, Los Angeles, United States*

Ling Liu, *Utah State University, United States*
 Zhenhai Xia, *University of North Texas, United States*
 Charles Wojnar, *Missouri S&T, United States*
 Baoxing Xu, *University of Virginia, School of Engineering and Applied Sciences, United States*
 Kevin Turner, *University of Pennsylvania, United States*
 Weiyi Lu, *Michigan State University, United States*
 Xianqiao Wang, *University of Georgia, United States*
 Jun Xu, *Beihang University, China*
 Elham Sahraei Esfahani, *George Mason University, United States*
 Junfeng Xiao, *Huazhong University of Science and Technology, China*
 Jun Xu, *Beihang University, China*
 Sha Yin, *Beihang University, China*
 Wei Gao, *University of Texas at San Antonio, United States*
 Pei Dong, *George Mason University, United States*
 Baoxing Xu, *University of Virginia, School of Engineering and Applied Sciences, United States*
 Mohsen Asle Zaeem, *Colorado School of Mines, United States*
 Mahmood Mamivand, *Boise State University, United States*
 Adrian Sabau, *Oak Ridge National Laboratory, United States*
 Patricia Iglesias, *Rochester Institute of Technology, United States*
 Ana Eva Jimenez Ballesta, *Technical University of Cartagena, Spain*

Session Organizers

Robabeh Jazaei, *University of Nevada, Las Vegas, United States*
 Eric Markvicka, *Carnegie Mellon University, United States*
 Cunjiang Yu, *University of Houston, United States*

Patrick Brewick, *US Naval Research Laboratory, United States*
 Zahabul Islam, *Pennsylvania State University, United States*
 Mauricio Cornejo, *Escuela Superior Politecnica del Litoral, Ecuador*
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 Ling Liu, *Utah State University, United States*
 Charles Wojnar, *Missouri S&T, United States*
 Baoxing Xu, *University of Virginia, School of Engineering and Applied Sciences, United States*
 Weiyi Lu, *Michigan State University, United States*
 Binghe Liu, *Beijing University of Aeronautics and Astronautics, China*
 Sha Yin, *Beihang University, China*
 Akio Yonezu, *Chuo University, Japan*
 Sha Yin, *Beihang University, China*
 Pei Dong, *George Mason University, United States*
 Wei Gao, *University of Texas at San Antonio, United States*
 Mohsen Asle Zaeem, *Colorado School of Mines, United States*
 Siddhartha Pathak, *University of Nevada, Reno, United States*
 Patricia Iglesias, *Rochester Institute of Technology, United States*
 Hong Guo, *Rochester Institute of Technology, United States*

TRACK 11 MATERIALS: GENETICS TO STRUCTURES

MONDAY, NOVEMBER 12

11-2 NANOMATERIALS FOR ENERGY

11-2-1 Nanomaterials for Energy I

Third Floor, David L. Lawrence Convention Center, Room 321
9:45am–11:30am

Session Chair: Michael Pettes, *University of Connecticut, Storrs, CT, United States*

Session Co-Chair: Arunkumar Subramanian, *University of Illinois at Chicago, Glen Allen, VA, United States*

9:45am – Thermal Characteristic Study on Si-Ge Heterostructure Interface Formed by Film-Wafer Bonding

Technical Presentation. IMECE2018-86443

Sien Wang, Dongchao Xu, Yue Xiao, Qing Hao, *University of Arizona, Tucson, AZ, United States*

10:06am – Understanding Processing Dependent Morphology of P3HT:PCBM Bulk-Heterojunction Thin Films by Coarse-Grained Molecular Simulations

Technical Presentation. IMECE2018-86438

Joydeep Munshi, *Lehigh University, Bethlehem, PA, United States*, **Wei Chen,** *Northwestern University, Evanston, IL, United States*, **TeYu Chien,** *University of Wyoming, Laramie, WY, United States*, **Ganesh Balasubramanian,** *Lehigh University, Bethlehem, PA, United States*

10:27am – Electrochemical-Mechanical Modeling and Degradation Analysis of Li-ion Batteries: Part I

Technical Presentation. IMECE2018-87409

Wei Lu, *University of Michigan, Ann Arbor, MI, United States*

10:48am – Electrochemical-Mechanical Modeling and Degradation Analysis of Li-Ion Batteries: Part II

Technical Presentation. IMECE2018-87410

Wei Lu, *University of Michigan, Ann Arbor, MI, United States*

11:09am – Stabilization of Graphene Dispersions by Cellulose Nanocrystals Colloids

Technical Paper Publication. IMECE2018-87830

Danny Illera, *Universidad del Norte, Barranquilla, Colombia*, **Chatura Wickramaratne, Diego Guillen, Chand Jotshi,** *University of South Florida, Tampa, FL, United States*, **Humberto Gomez,** *Universidad del Norte, Barranquilla, Colombia*, **D. Yogi Goswami,** *University of South Florida, Tampa, FL, United States*

11-7 FRACTURE AND DAMAGE: NANO-TO MACRO-SCALE

11-7-1 Fracture and Damage: Nano- to Macro-Scale I

Third Floor, David L. Lawrence Convention Center, Room 320
9:45am–11:30am

Session Chair: Raghu Prakash, *Indian Institute of Technology Madras, Chennai, India*

Session Co-Chair: Robabeh Jazaei, *University of Nevada, Las Vegas, Las Vegas, NV, United States*

9:45am – Effect of Hold-Time Interspersed With Cyclic Loading on Corrosion Fatigue Crack Growth Rate of a Steel in Sodium Chloride Solution

Technical Paper Publication. IMECE2018-86417

Raghu Prakash, *Indian Institute of Technology Madras, Chennai, India*, **Dhinakaran Sampath,** *University of Manchester, Manchester, United Kingdom*

10:06am – Degradation of the Strength of a Grain and a Grain Boundary Due to the Accumulation of the Structural Defects of Crystal

Technical Paper Publication. IMECE2018-87264

Guoxiong Zheng, Yifan Luo, Hideo Miura, *Tohoku University, Sendai, Miyagi, Japan*

10:27am – Crystallinity-Induced Variation of the Electronic Characteristics of Electroplated Gold Thin Films

Technical Paper Publication. IMECE2018-87278

Yutaro Nakoshi, *Tohoku University, Aoba-ku, Seidai, Japan*, **Hideo Miura,** *Tohoku University, Sendai, Miyagi, Japan*

10:48am – A Crack Detection and Evaluation Method for Self-Piercing Riveting

Technical Paper Publication. IMECE2018-88403

Xuyang Wang, Yudong Fang, *Chongqing University, Chongqing, China*, **Zhenfei Zhan,** *Chongqing University, Livonia, MI, United States*

11:09am – Energy Absorption of Cementitious Composite Incorporating Polypropylene and Cold-Drawn Shaved Steel Fiber Under Low-Velocity Impact Test

Technical Presentation. IMECE2018-88514

Robabeh Jazaei, Samad Gharehdaghi, Fatemeh Azari, *University of Nevada, Las Vegas, Las Vegas, NV, United States*

11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

11-8-1 Material Processing of Flexible Electronics, Sensors, and Devices I

Third Floor, David L. Lawrence Convention Center, Room 330
9:45am–11:30am

Session Chair: Cunjiang Yu, *University of Houston, Houston, TX, United States*

Session Co-Chair: Jianliang Xiao, *University of Colorado Boulder, Boulder, CO, United States*

9:45am – Flexible, Stretchable and Healable Electronics

Invited Presentation. IMECE2018-89522

Fabio Cicoira, *Polytechnique Montréal, Montréal, QC, Canada*

10:27am – Fully Rubbery Integrated Electronics and Sensors

Technical Presentation. IMECE2018-89840

Cunjiang Yu, Kyoseung Sim, *University of Houston, Houston, TX, United States*

10:48am – Motion Artifact Free Monitoring of EMG/ECG Biopotentials Using Sub-300 nm Self-Adhesive and Ultra-Conformable Au/Parylene Thin-Film Electrodes

Technical Presentation. IMECE2018-89610

Robert Nawrocki, *Purdue University, West Lafayette, IN, United States*, **Hanbit Jin, Sunghoon Lee, Tomoyuki Yokota, Masaki Sekino, Takao Someya**, *University of Tokyo, Tokyo, Japan*

11:09am – Transparent, Stretchable Conductor With Direct Laser Writing

Technical Presentation. IMECE2018-89805

Chengfeng Pan, Kitty Kumar, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Jianzhao Li**, *University of Toronto, Toronto, ON, Canada*, **Eric Markvicka**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Peter Herman**, *University of Toronto, Toronto, ON, Canada*, **Carmel Majidi**, *Carnegie Mellon University, Pittsburgh, PA, United States*

11-11 MODELING, SIMULATION, AND DESIGN OF MULTIFUNCTIONAL MATERIALS

11-11-1 Modeling, Simulation and Design of Multifunctional Materials 1

Fourth Floor, David L. Lawrence Convention Center, Room 407
9:45am–11:30am

Session Chair: Ling Liu, *Utah State University, Logan, UT, United States*

Session Co-Chairs: Charles Wojnar, *Missouri S&T, Rolla, MO, United States*, Zhenhai Xia, *University of North Texas, Denton, TX, United States*

9:45am – Metal-Organic-Frameworks as Efficient Electrocatalysts for Oxygen Evolution Reaction: Insights Into the Active Centers

Technical Presentation. IMECE2018-86624

Chun-Yu Lin, *University of North Texas, Denton, TX, United States*, **Shuangyin Wang**, *Hunan University, Changsha, China*, **Zhenhai Xia**, *University of North Texas, Denton, TX, United States*

10:06am – Dimensional Control of Defect Dynamics in Perovskite Oxide Superlattices

Technical Presentation. IMECE2018-89356

Lipeng Zhang, *Beijing University of Chemical Technology, Beijing, China*, **Haixuan Xu, Isaac Bredeson**, *University of Tennessee, Knoxville, TN, United States*, **Valentino R. Cooper, Paul R. Kent**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

10:27am – Numerical Investigation on Percolation Threshold of CNT-Reinforced Conductive Composites Based on Three-Dimensional Monte Carlo Method

Technical Paper Publication. IMECE2018-86794

Zhuangzhuang He, Lijun Li, *Beihang University, Beijing, China*, **Taikun Wang, Yantao Wang**, *Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering, Zhengzhou, China*, **Xudong Yang, Wenming Yang**, *Beihang University, Beijing, China*

10:48am – Dexterous Hybrid Robotics for High Precision Applications

Technical Paper Publication. IMECE2018-86856

Mitch Crowther, Nolan Jackson, Minchul Shin, *Georgia Southern University, Statesboro, GA, United States*

11:09am – Uncertainty Quantification of Artificial Neural Network Based Machine Learning Potentials

Technical Paper Publication. IMECE2018-88071

Yumeng Li, Weirong Xiao, Pingfeng Wang, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

11-2 NANOMATERIALS FOR ENERGY

11-2-2 Nanomaterials for Energy II

Third Floor, David L. Lawrence Convention Center, Room 321
1:45pm–3:30pm

Session Chair: Arunkumar Subramanian, *University of Illinois at Chicago, Glen Allen, VA, United States*

Session Co-Chair: Michael Pettes, *University of Connecticut, Storrs, CT, United States*

1:45pm – Energy Sensitivity of Charge Carriers for Detecting Scattering and Transport

Technical Presentation. IMECE2018-88970

Shuang Tang, *State University of New York, Utica, NY, United States*

2:06pm – Guiding Principles for Designing Highly-Efficient Metal-Free Carbon Catalysts

Technical Presentation. IMECE2018-89358

Lipeng Zhang, *Beijing University of Chemical Technology, Beijing, China*, Zhenhai Xia, *University of North Texas, Denton, TX, United States*

2:27pm – Advanced FeOOH-MWCNTS Composite Negative Electrodes With High Areal Capacitance for Asymmetric Supercapacitors

Technical Presentation. IMECE2018-89814

Ri Chen, Rakesh Sahu, Igor Zhitomirsky, Ishwar K. Puri, *McMaster University, Hamilton, ON, Canada*

2:48pm – Entropy Generation Minimization in Polyurethane Silica Nano-Composite Membrane

Technical Presentation. IMECE2018-89848

Omar Almahmoud, Tae-Youl Choi, *University of North Texas, Denton, TX, United States*

3:09pm – Oxygen and Water Vapor Effects on Photoelectronic Properties of Monolayer Tungsten Disulfide via Chemical Vapor Deposition

Technical Presentation. IMECE2018-89869

Hanyu Zhang, Jeremy Dunklin, Obadiah Reid, Sanjini Nanayakkara, Jeffrey Blackburn, Elisa M. Link, *National Renewable Energy Laboratory, Golden, CO, United States*

11-7 FRACTURE AND DAMAGE: NANO- TO MACRO-SCALE

11-7-2 Fracture and Damage: Nano- to Macro-Scale II

Third Floor, David L. Lawrence Convention Center, Room 320
1:45pm–3:30pm

Session Chair: Eric Markvicka, *Carnegie Mellon University, Pittsburgh, PA, United States*

Session Co-Chair: Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

1:45pm – Tensile Deformation Mechanisms in Nickel-Cobalt Core-Shell Nanowires via Molecular Dynamics Simulations

Technical Presentation. IMECE2018-89138

Ali Shiave, *University of North Carolina at Greensboro, Greensboro, NC, United States*, Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

2:06pm – Stiffness Percolation at High Crack Densities: Fragmentation and Interlocking

Technical Presentation. IMECE2018-89298

Anirban Pal, Catalin Picu, *Rensselaer Polytechnic Institute, Troy, NY, United States*

2:27pm – Damage Detection and Localization in Soft-Matter Systems

Technical Presentation. IMECE2018-89585

Eric Markvicka, *Carnegie Mellon University, Pittsburgh, PA, United States*, Michael D. Bartlett, Ravi Tutika, *Iowa State University, Ames, IA, United States*, Carmel Majidi, *Carnegie Mellon University, Pittsburgh, PA, United States*

2:48pm – Investigating Damage Initiation Sites in Metallic Microstructures Using Atomistic Modeling of Interfaces

Technical Presentation. IMECE2018-89613

Jacob Tavenner, *Colorado School of Mines, Golden, CO, United States*, Ian Bakst, *Colorado State University, Fort Collins, CO, United States*, Garritt Tucker, *Colorado School of Mines, Golden, CO, United States*, Christopher Weinberger, *Colorado State University, Fort Collins, CO, United States*

3:09pm – Influences of Plasticity-Induced Crack Closure on Fatigue Crack Healing of Carbon Steel With Heat Treatment

Technical Paper Publication. IMECE2018-86650

Eiichi Hamada, Yuto Furuya, Atsushi Hosoi, *Waseda University, Tokyo, Shinjuku, Japan*, Yuji Morita, *Nippon Pneumatic Mfg. Co., Ltd., Mie, Nabari, Japan*, Hiroyuki Kawada, *Waseda University, Tokyo, Shinjuku, Japan*

11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

11-8-2 Material Processing of Flexible Electronics, Sensors, and Devices II

Third Floor, David L. Lawrence Convention Center, Room 330
1:45pm–3:30pm

Session Chair: Jianliang Xiao, *University of Colorado Boulder, Boulder, CO, United States*

Session Co-Chair: Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

1:45pm – Cellulose in Electrical and Electrochemical Flexible Devices

Invited Presentation. IMECE2018-89411

Luis Pereira, *CENIMAT/13N, Caparica, Portugal*

2:27pm – Nanoporous Paper-Based Electrodes for Biosensing

Technical Presentation. IMECE2018-89592

Ramendra Pal, Tongfen Liang, Thomas McGovern, Samantha Moy, Mehdi Javanmard, Aaron Mazzeo, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

2:48pm – Rehealable, Fully Recyclable and Malleable Electronic Skin

Technical Presentation. IMECE2018-89028
Zhanan Zou, Jianliang Xiao, Wei Zhang, *University of Colorado Boulder, Boulder, CO, United States*

3:09pm – A Field Deployable Biosensor for Virus Detection Using DNA Hybridization

Technical Presentation. IMECE2018-89833
Jessica Snyder, Trevor Kalkus, *Universities Space Research Association, Sunnyvale, CA, United States*, Jesica Urbina, Nils Aversch, *Universities Space Research Association, Mountain View, CA, United States*, David Biebert, *US Geological Survey, Madison, WI, United States*, Lynn Rothschild, *NASA, Moffett Field, CA, United States*

11-11 MODELING, SIMULATION, AND DESIGN OF MULTIFUNCTIONAL MATERIALS

11-11-2 Modeling, Simulation and Design of Multifunctional Materials 2

Fourth Floor, David L. Lawrence Convention Center, Room 407
1:45pm–3:30pm

Session Chair: Ling Liu, *Utah State University, Logan, UT, United States*

Session Co-Chairs: Charles Wojnar, *Missouri S&T, Rolla, MO, United States*, Zhenhai Xia, *University of North Texas, Denton, TX, United States*

1:45pm – A Multiphysics Thermoelastoviscoplastic Damage Coupled With a Magnetism Internal State Variable Model

Technical Presentation. IMECE2018-87945
Mounia Malki, Mark Horstemeyer, Michael Baskes, Yucheng Liu, Lei Chen, *Mississippi State University, Starkville, MS, United States*

2:06pm – Viscoelastic Behavior of Carbon Nanotube Yarns and Twisted Coils

Technical Paper Publication. IMECE2018-88095
Pouria Khanbolouki, Mehran Tehrani, *University of New Mexico, Albuquerque, NM, United States*

2:27pm – Multi-field, Multi-layer, and Segmented Composite Beam Optimization for Shape, Work, and Cost

Technical Presentation. IMECE2018-89910
Anil Erol, Mary Frecker, Paris Von Lockette, *Pennsylvania State University, University Park, PA, United States*

2:48pm – A Thermo-Electro-Elasto-Viscoplastic Damage Internal State Variable (ISV) Model for Ductile Metals

Technical Paper Publication. IMECE2018-86598
Nikolay Dimitrov, Yucheng Liu, Mark Horstemeyer, *Mississippi State University, Starkville, MS, United States*

3:09pm – Hybrid Alumina Composites for Cutting Tool Inserts: Material Design and Development

Technical Paper Publication. IMECE2018-87255
Taha Waqar, Syed Sohail Akhtar, Abul Fazal M. Arif, Khaled Al-Athel, *King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia*

11-4 MATERIALS AND 3D PRINTING FOR BIOLOGY AND MEDICINE

11-4-1 Materials and 3D Printing for Biology and Medicine

Fourth Floor, David L. Lawrence Convention Center, Room 407
3:45pm–5:30pm

Session Chair: Lijie Grace Zhang, *George Washington University, Washington, DC, United States*

3:45pm – 3D Printed Shape-Changing Cardiovascular Implants for Accommodating Growth

Technical Presentation. IMECE2018-89032
Ozan Erol, *Johns Hopkins University, Aberdeen, MD, United States*, Emilio Bachtar, Azra Horowitz, Sung Kang, *Johns Hopkins University, Baltimore, MD, United States*

4:06pm – Four Dimensional Printing of Smart Tissue Constructs

Technical Presentation. IMECE2018-86412
Shida Miao, Haitao Cui, Se Jun Lee, Xuan Zhou, Lijie Grace Zhang, *George Washington University, Washington, DC, United States*

4:27pm – A Pufferfish-Inspired Ingestible Hydrogel Machine

Technical Presentation. IMECE2018-88955
Xinyue Liu, Shaoting Lin, Christoph Steiger, Xuanhe Zhao, *Massachusetts Institute of Technology, Cambridge, MA, United States*

4:48pm – A Novel Microlaser Based Plasmonic-Polymer Hybrid Resonator

Technical Paper Publication. IMECE2018-86998
Maurizio Manzo, Ryan Schwend, *University of North Texas, Denton, TX, United States*

5:09pm – 3D Bioprinting of Thick Cardiac Constructs With Perfusable Vessels

Technical Presentation. IMECE2018-86261
Lijie Grace Zhang, Haitao Cui, *George Washington University, Washington, DC, United States*, Muhammad Mohiuddin, *University of Maryland, Baltimore, MD, United States*

11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

11-8-3 Material Processing of Flexible Electronics, Sensors, and Devices III

Third Floor, David L. Lawrence Convention Center, Room 330
3:45pm–5:30pm

Session Chair: Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

Session Co-Chair: Yuris Dzenis, *University of Nebraska–Lincoln, Lincoln, NE, United States*

3:45pm – Flexible Beta-Ga₂O₃ High Power Electronics

Invited Presentation. IMECE2018-89204

Jung-Hun Seo, *University at Buffalo, State University of New York, Buffalo, NY, United States*

4:27pm – Printed Electronics From Low-Dimensional Nanomaterials—Toward Low-Cost Transistors, Sensors, and Energy Devices

Technical Presentation. IMECE2018-89991

Changyong Cao, *Michigan State University, East Lansing, MI, United States*

4:48pm – Stretchable Silver Nanowire Micro-Conductors by Direct Inkjet Printing

Technical Presentation. IMECE2018-89251

Qijin Huang, Karam N. Al-Milaji, Hong Zhao, *Virginia Commonwealth University, Richmond, VA, United States*

5:09pm – Tunable Electrical Properties of Embossed, Cellulose-Based Paper

Technical Presentation. IMECE2018-89695

Tongfen Liang, Xiyue Zou, Jiaqi Liu, Maame Assasie, Wei-Jian Guo, Chuyang Chen, Jingjin Xie, Max Tenorio, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, Assimina Pelegri, *Rutgers, The State University of New Jersey, East Brunswick, NJ, United States*, Aaron Mazzeo, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

11-9 MATERIALS PROCESSING AND CHARACTERIZATION

11-9-1 Materials Processing and Characterization I

Third Floor, David L. Lawrence Convention Center, Room 320
3:45pm–5:30pm

Session Chair: Sridhar Santhanam, *Villanova University, Collegeville, PA, United States*

Session Co-Chair: Raghu Prakash, *Indian Institute of Technology Madras, Chennai, India*

3:45pm – Influence of Thermal Ratcheting on the Creep and Mechanical Properties of High Density Polyethylene (HDPE)

Technical Paper Publication. IMECE2018-86043

Rahul Palaniappan Kanthabhabha Jeya, Abdel-Hakim Bouzid, *École Technologie Supérieure, Montreal, QC, Canada*

4:06pm – Investigation of Process Parameters on Dry Sliding Wear of Self-Lubricating Metal Matrix Composites

Technical Paper Publication. IMECE2018-86248

Senthil Kumar Velukkudi Santhanam, *College Of Engineering, Guindy, Chennai, India*, Dhanashekar Manickam, Karthikeyan S., *Anna University, Chennai, Tamil Nadu, India*

4:27pm – Effect of Micro (Banana) and Nano (SiC) Fillers on Mechanical Behaviors of Basalt/Epoxy Hybrid Composites

Technical Paper Publication. IMECE2018-86268

Senthil Kumar Velukkudi Santhanam, *College of Engineering, Guindy, Chennai, India*, Bharani Srikanth P., Prakash Sampath, Mohan Bangaru, *Anna University, Chennai, India*

4:48pm – Localized Fatigue Response Evaluation of Weld Regions Through Cyclic Indentation Studies

Technical Paper Publication. IMECE2018-86420

Raghu Prakash, *Indian Institute of Technology Madras, Chennai, India*, Krishna Madhavan, *SASTRA University, Thanjavur, India*, Anirudh Prakash, *National Institute of Technology Tiruchirappalli, Tiruchirappalli, India*, Pankaj Dhaka, *Indian Institute of Technology Madras, Chennai, Tamilnadu, Tamilnadu, India*

5:09pm – Investigations on the Structure and Properties of the Hot Extruded AA2014-Nano SiCp Composite

Technical Paper Publication. IMECE2018-87237

Karibeeran Shanmuga Sundaram, Raja Manickam S, Ramaiyan Sankar, *Anna University, Chennai, Tamilnadu, India*, Dhanalakshmi Sathishkumar, *CVRDE, Chennai, Tamilnadu, India*

11-15 MULTIFUNCTIONAL NANOMATERIALS

11-15-1 Multifunctional Nanomaterials 1

Third Floor, David L. Lawrence Convention Center, Room 321
3:45pm–5:30pm

Session Chair: Pei Dong, *George Mason University, Fairfax, VA, United States*

Session Co-Chair: Wei Gao, *University of Texas at San Antonio, San Antonio, TX, United States*

3:45pm – An Elastothermoviscoplasticity Anisotropic Damage Model for Short Fiber Reinforced Polymer Composites

Technical Paper Publication. IMECE2018-86286

Ge He, Yucheng Liu, *Mississippi State University, Mississippi State, MS, United States*, Mark Horstemeyer, Douglas J. Bammann, *Mississippi State University, Starkville, MS, United States*

4:06pm – Tailoring the Property of Nanocomposites Using Nickel Coated Carbon Nanotube and Magnetic Field

Technical Presentation. IMECE2018-89727

Ahmed M. Abdalla, Rakesh Sahu, Ishwar K. Puri, *McMaster University, Hamilton, ON, Canada*

4:27pm – Hybrid Nanomaterials and Their Applications in Energy and Water Areas

Technical Presentation. IMECE2018-86585

Pei Dong, *George Mason University, Fairfax, VA, United States*, Jun Lou, *Rice University, Houston, TX, United States*

4:48pm – Functionalized Cellulose Nanocrystals for Improving the Mechanical Properties of Poly(Lactic Acid)

Technical Paper Publication. IMECE2018-87691

Jamileh Shojaeiarani, Dilpreet Bajwa, *North Dakota State University, Fargo, ND, United States*

5:09pm – Phase Transition of Monolayer MoTe₂: The Role of Stress

Technical Presentation. IMECE2018-87969

Wei Gao, *University of Texas at San Antonio, San Antonio, TX, United States*

TUESDAY, NOVEMBER 13

11-23 PLENARY

11-23-1 Materials: Genetics to Structures Plenary I
Third Floor, David L. Lawrence Convention Center, Room 307
8:00am–8:45am

8:00am – Biological Materials and Mechanics: Challenges and Opportunities

Plenary Presentation. IMECE2018-90108

Marc Meyers, *University of California San Diego, La Jolla, CA, United States*

11-23 PLENARY

11-23-2 Materials: Genetics to Structures Plenary II
Third Floor, David L. Lawrence Convention Center, Room 307
9:00am–9:45am

9:00am – The Future of Aerospace Materials: Challenges and Opportunities

Plenary Presentation. IMECE2018-90109

Richard Vaia, *Air Force Research Laboratory, Functional Materials Division, WPAFB, OH, United States*

11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

11-8-4 Material Processing of Flexible Electronics, Sensors, and Devices IV

Third Floor, David L. Lawrence Convention Center, Room 333
10:00am–11:45am

Session Chair: Yuris Dzenis, *University of Nebraska–Lincoln, Lincoln, NE, United States*

Session Co-Chair: Woon-Hong Yeo, *Georgia Institute of Technology, Atlanta, GA, United States*

10:00am – Large-Scale Hybrid Monolithic Nanomanufacturing of Liquid-Solid Heterojunction Devices for Self-Powered Smart Skin

Invited Presentation. IMECE2018-89581

Wenzhuo Wu, *Purdue University, West Lafayette, IN, United States*

10:42am – EGaIn–Metal Interfacing for Microelectronics Integration in Liquid Metal-Based Stretchable Electronics

Technical Presentation. IMECE2018-89634

Kadri Bugra Ozutemiz, James Wissman, O. Burak Ozdoganlar, Carmel Majidi, *Carnegie Mellon University, Pittsburgh, PA, United States*

11:03am – Molecular Configuration of Solution-Processed Interfaces Between Inorganic–Organic Hybrid Perovskite and Electron Transport Layer

Technical Presentation. IMECE2018-88120

M.F.N. Taufique, *Washington State University Pullman, WA, United States*, Samrat Choudhury, *University of Idaho, Moscow, ID, United States*, Soumik Banerjee, *Washington State University*

11:24am – Additive Manufacturing of Polymer Nanocomposites With In Situ Strain Sensing Capability
 Technical Paper Publication. IMECE2018-86263
Mohammad Abshirini, Mohammad Charara, Yingtao Liu, Mrinal Saha, M. Cengiz Altan, *University of Oklahoma, Norman, OK, United States*

11-9 MATERIALS PROCESSING AND CHARACTERIZATION

11-9-2 Materials Processing and Characterization II
 Third Floor, David L. Lawrence Convention Center, Room 331
 10:00am–11:45am

Session Chair: Patrick Brewick, *U.S. Naval Research Laboratory, Washington, DC, United States*

Session Co-Chair: Zahabul Islam, *Pennsylvania State University, State College, PA, United States*

10:00am – Low Temperature Annealing of Metals With Electrical Wind Force Effects

Technical Presentation. IMECE2018-86350
Daudi Waryoba, *Pennsylvania State University, DuBois, PA, United States*, **Zahabul Islam, Baoming Wang**, *Pennsylvania State University, State College, PA, United States*, **Md. Haque**, *Pennsylvania State University, University Park, PA, United States*

10:21am – Influence of Ca-Ba and Sr Base Inoculants on Metallurgical and Mechanical Properties of Grey and Ductile Cast Irons

Technical Paper Publication. IMECE2018-86448
Dhruv Patel, *Aditya Silver Oak Institute of Technology, Ahmedabad, India*, **Devendra Parmar**, *Silver Oak College of Engineering and Technology, Rajkot, India*, **Siddharthsinh Jadeja**, *Aditya Silver Oak Institute of Technology, Rajkot Gujarat, India*

10:42am – Modeling the Influence of Microstructure on Stress Distributions and Concentrations in Pitting Corrosion

Technical Paper Publication. IMECE2018-86465
Patrick Brewick, Andrew Geltmacher, *U.S. Naval Research Laboratory, Washington, DC, United States*, **Siddiq Qidwai**, *National Science Foundation, Arlington, VA, United States*

11:03am – Hardness Improvement of Binderless Boron Nitride Composites Through Hybrid CO₂ Laser–Waterjet Heat Treatment

Technical Presentation. IMECE2018-86740
Jingnan Zhao, *Tianjin University of Science and Technology, Tianjin, China*, **Pranav Shrotriya**, *Iowa State University, Ames, IA, United States*, **Jian Guo, Xiaolei Ma**, *Tianjin University of Science and Technology, Tianjin, China*

11:24am – Fatigue Crack Growth Rate Studies on Stainless Steel Welds

Technical Paper Publication. IMECE2018-86915
Manuel Thomas, Raghu Prakash, Ganesh Sundararaman, *Indian Institute of Technology Madras, Chennai, Tamilnadu, India*, **Vasudevan Muthukumar**, *Indira Gandhi Centre for Atomic Research, Kalpakkam, Tamilnadu, India*

11-12 MECHANICS IN MANUFACTURING OF MULTIFUNCTIONAL MATERIALS AND STRUCTURES

11-12-1 Mechanics in Manufacturing of Multifunctional Materials and Structures I
 Third Floor, David L. Lawrence Convention Center, Room 334
 10:00am–11:45am

Session Chair: Baoxing Xu, *University of Virginia, Charlottesville, VA, United States*

Session Co-Chair: Weiyi Lu, *Michigan State University, East Lansing, MI, United States*

10:00am – Material Interactions and Self-Assembly Through a Dual-Droplet Inkjet Printing Process

Invited Presentation. IMECE2018-88766
Hong Zhao, *Virginia Commonwealth University, Richmond, VA, United States*

10:21am – Structurally Robust Thermal Insulating Coating for Improving Building Energy Efficiency

Technical Presentation. IMECE2018-86599
Rui Kou, Ying Zhong, Meng Wang, Yu Qiao, *University of California San Diego, La Jolla, CA, United States*

10:42am – Scale-Up Processing and Testing of Multifunctional Current Collector in Large Format Lithium-Ion Battery Pouch Cells

Technical Presentation. IMECE2018-86107
Meng Wang, Yu Qiao, *University of California San Diego, La Jolla, CA, United States*

11:03am – Strain Engineering of 2D Materials: The Essential Role of Interface

Technical Presentation. IMECE2018-89079
Zhaohu Dai, *University of Texas at Austin, Austin, TX, United States*

11:24am – Liquid Evaporation-Driven Self-Folding of Free-Standing Graphene

Technical Presentation. IMECE2018-89109
Qingchang Liu, *University of Virginia, Charlottesville, VA, United States*

11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES

11-14-4 Multifunctional Composite Materials and Structures 4

Fourth Floor, David L. Lawrence Convention Center, Room 407
10:00am–11:45am

Session Chair: Jun Xu, *Beihang University, Beijing, China*

Session Co-Chair: Sha Yin, *Beihang University, Beijing, China*

10:00am – Effect of Nail Penetration Rate on Short Circuit and Thermal Runaway Behavior of Lithium-Ion Battery

Technical Presentation. IMECE2018-87453

Zhiguo Hong, Sha Yin, Jun Xu, *Beihang University, Beijing, China*

10:21am – A Detailed Mechanical Model of 18650 Lithium-Ion Battery

Technical Presentation. IMECE2018-89127

Lubing Wang, Jun Xu, Jia Yikai, *Beihang University, Beijing, China*

10:42am – Fabrication and Properties Characterization of Composite Structural Electrolyte

Technical Presentation. IMECE2018-89945

Zihan Hu, Sha Yin, Huitian Wang, Haoyu Chen, *Beihang University, Beijing, Beijing, China*

11:03am – Flatwise Mechanical Behavior and Energy Absorption of Tube Integrated Honeycombs

Technical Presentation. IMECE2018-89942

Yaobo Wu, Haoyu Chen, Huitian Wang, Sha Yin, *Beihang University, Beijing, China*

11:24am – Damping Characterization of Hierarchical Composites

Technical Presentation. IMECE2018-89641

Suma Ayyagari, Marwan Al-Haik, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

11-9 MATERIALS PROCESSING AND CHARACTERIZATION

11-9-3 Materials Processing and Characterization III

Third Floor, David L. Lawrence Convention Center, Room 331
1:45pm–3:30pm

Session Chair: Mauricio Cornejo, *Escuela Superior Politecnica del Litoral, Guayaquil, Ecuador*

Session Co-Chair: Frank J. Shih, *Seattle University, Seattle, WA, United States*

1:45pm – Anti-Corrosive Coating Using Recycled High Density Polyethylene for Automotive Chassis

Technical Paper Publication. IMECE2018-86498

Joshua Bachert, Ahm Rahman, Ma'moun Abu-Ayyad, *Pennsylvania State Harrisburg, Middletown, PA, United States*

2:06pm – A Study on the Corrosion and Mechanical Properties of an Al6063 Reinforced With Egg Shell Ash and Rice Husk Ash

Technical Paper Publication. IMECE2018-86662

Nosa Idusuyi, *University of Ibadan, Ibandan, Oyo, Nigeria*, Peter Oviroh, *University of Johannesburg, Johannesburg, South Africa*, Adetoye Henry Adekoya, *University of Ibadan, Ibandan, Oyo, Nigeria*

2:27pm – Assessment of Induced Delamination During End-Milling of Natural Fiber Reinforced Composites: A Statistical Analysis

Technical Paper Publication. IMECE2018-86978

Khalid Alzebeid, Mahmoud Nassar, Nasr Al-Hinai, *Sultan Qaboos University, Al-Khod, Oman*

2:48pm – Effect of Calcium Hydroxide and Water to Solid Ratio on Compressive Strength of Mordenite-Based Geopolymer and the Evaluation of Its Thermal Transmission Property

Technical Paper Publication. IMECE2018-87625

Mauricio Cornejo, Bolivar Togra, Haci Baykara, Guillermo E. Soriano, Cecilia Paredes, *Escuela Superior Politecnica del Litoral, Guayaquil, Guayas, Ecuador*, Jan Elsen, *Katholieke Universiteit Leuven, Leuven, Belgium*

3:09pm – Recycling of Thermoplastic Waste in the Industry

Technical Presentation. IMECE2018-87979

Sadek Salem Cherif, *University of Sciences and Technology of Oran Mohamed Boudiaf, Tizi-Ouzou, Algeria*

11-10 BIOINSPIRED MATERIALS, STRUCTURES AND APPLICATIONS

11-10-1 Bioinspired Composites and Structures

Third Floor, David L. Lawrence Convention Center, Room 333
1:45pm–3:30pm

Session Chair: Seyed Allameh, *Northern Kentucky University, Highland Heights, KY, United States*

Session Co-Chair: Zhenhai Xia, *University of North Texas, Denton, TX, United States*

1:45pm – Mechanical Properties of 3D Printed Biomimicked Composites

Technical Paper Publication. IMECE2018-86309

Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*, Roger Miller, Hadi Allameh, *Northern Kentucky University, Highland Heights, KY, United States*

2:06pm – Bioinspired Materials for Water Vapor Harvesting

Technical Presentation. IMECE2018-86828

Yiyang Wan, *University of North Texas, Denton, TX, United States*, Yong Gao, *Northwestern Polytechnical University, Xi'an, Shannxi, China*, Zhenhai Xia, *University of North Texas, Denton, TX, United States*

2:27pm – Magnetically Actuated Dynamic Iridescence Inspired by the Neon Tetra

Technical Presentation. IMECE2018-87100

Zhiren Luo, *North Carolina State University, Raleigh, NC, United States*, **Benjamin Evans**, *Elon University, Elon, NC, United States*, **Chih-Hao Chang**, *North Carolina State University, Raleigh, NC, United States*

2:48pm – Enhancing Light Transmission in Nacre-Inspired Multilayer Composites Using Interfacial Nanostructures

Technical Presentation. IMECE2018-87506

Yi-An Chen, **Chih-Hao Chang**, *North Carolina State University, Raleigh, NC, United States*, **Sharan/S.V. Naidu**, *GlobalFoundries, Raleigh, NC, United States*, **Zhiren Luo**, *North Carolina State University, Raleigh, NC, United States*

11-12 MECHANICS IN MANUFACTURING OF MULTIFUNCTIONAL MATERIALS AND STRUCTURES

11-12-2 Mechanics in Manufacturing of Multifunctional Materials and Structures II

Third Floor, David L. Lawrence Convention Center, Room 334
1:45pm–3:30pm

Session Chair: Weiyi Lu, *Michigan State University, East Lansing, MI, United States*

Session Co-Chair: Baoxing Xu, *University of Virginia, Charlottesville, VA, United States*

1:45pm – Micro- and Macro-Modeling and Applications of Soft Magneto-Active Elastomers

Invited Presentation. IMECE2018-89993

Yin Liu, **Changyong Cao**, *Michigan State University, East Lansing, MI, United States*

2:06pm – Adhesion Tuning Through Embedded Pneumatic Channels

Technical Presentation. IMECE2018-89897

Aoyi Luo, *University of Pennsylvania, Philadelphia, PA, United States*, **Amir M. Nasab**, *University of Nevada, Reno, Reno, NV, United States*, **Wanliang Shan**, *University of Nevada Reno, Reno, NV, United States*, **Kevin Turner**, *University of Pennsylvania, Philadelphia, PA, United States*

2:27pm – Mechanics of Liquid-Assisted Mechanical Peeling of 2D Materials

Technical Presentation. IMECE2018-89108

Yue Zhang, *University of Virginia, Charlottesville, VA, United States*

2:48pm – Perturbation Analysis of Surface Amorphous Layer Formation

Technical Presentation. IMECE2018-88854

Rahul Basu, *VTU, Bangalore, Ka, India*

3:09pm – Analytical Investigation of the Stiffness of Homogenous Isotropic Mechanical Materials With Different Cross Sections

Technical Paper Publication. IMECE2018-86197

Michael Agarana, *Covenant University, Ota, Ogun State, Nigeria*, **Esther Akinlabi**, *University of Johannesburg, Johannesburg, Gauteng Province, South Africa*

11-15 MULTIFUNCTIONAL NANOMATERIALS

11-15-2 Multifunctional Nanomaterials 2

Fourth Floor, David L. Lawrence Convention Center, Room 407
1:45pm–3:30pm

Session Chair: Wei Gao, *University of Texas at San Antonio, San Antonio, TX, United States*

1:45pm – Application of Cellulose Nanocrystals and Zinc Oxide as Green Fire Retardant in High Density Polyethylene

Technical Presentation. IMECE2018-88214

Ghazal Vahidi, **Dilpreet Bajwa**, **Jamileh Shojaeiarani**, *North Dakota State University, Fargo, ND, United States*

2:06pm – Investigating Effects of Graphene Nanoinclusions for Improved Desalination Rates of Salt Water Under Solar Heat

Technical Paper Publication. IMECE2018-88637

Vinay Patil, **Aybala Usta**, **Muhammad Rahman**, **Ramazan Asmatulu**, *Wichita State University, Wichita, KS, United States*

2:27pm – One-Step Flame Synthesis of W/Moly/N Doped Titanium Dioxide Nanoparticles With Enhanced Photocatalytic Activity

Technical Presentation. IMECE2018-89617

Yuqian Zhang, **Zhizhong Dong**, **Gang Xiong**, **Stephen Tse**, **Bernard Kear**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

2:48pm – Designing Stiffness-Switching Thermoplastic Nanocomposites for Wearable and Robotic Applications

Technical Presentation. IMECE2018-89671

Steven Rich, **Carmel Majidi**, *Carnegie Mellon University, Pittsburgh, PA, United States*

11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

11-8-5 Material Processing of Flexible Electronics, Sensors, and Devices V

Third Floor, David L. Lawrence Convention Center, Room 304
3:45pm–5:30pm

Session Chair: Woon-Hong Yeo, *Georgia Institute of Technology, Atlanta, GA, United States*

Session Co-Chair: Aaron Mazzeo, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

3:45pm – A Highly Scalable Additive Printing Process for High-Performance and Flexible Thermoelectric Materials and Devices

Technical Presentation. IMECE2018-87747

Yanliang Zhang, *University of Notre Dame, Notre Dame, IN, United States*, Tony Varghese, *Boise State University, Boise, ID, United States*, Mortaza Saeidi-Javash, *University of Notre Dame, Notre Dame, IN, United States*

4:06pm – Processing of Surface Modified Barium Titanate Flexible Nanocomposite Films

Technical Presentation. IMECE2018-90025

Kimberly Cook-Chennault, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

4:27pm – Piezoelectric Polymer Thin Films With Architected Cuts for Enhancing Flexibility and Ambient Wind Energy Harvesting

Technical Presentation. IMECE2018-89034

Lichen Fang, Jing Li, Zeyu Zhu, Sung Kang, *Johns Hopkins University, Baltimore, MD, United States*

4:48pm – An Integrated Wearable Device based on Silver Nanowire Nanocomposites

Technical Presentation. IMECE2018-89918

Shanshan Yao, Bryan Vogel, Yong Zhu, *North Carolina State University, Raleigh, NC, United States*

11-9 MATERIALS PROCESSING AND CHARACTERIZATION

11-9-4 Materials Processing and Characterization IV

Third Floor, David L. Lawrence Convention Center, Room 331
3:45pm–5:30pm

Session Chair: Delfim Soares, *University of Minho, Guimaraes, Portugal*

Session Co-Chair: Raghu Prakash, *Indian Institute of Technology Madras, Chennai, India*

3:45pm – Experimental Investigating the Impact of Ionic Liquid on PET's Properties

Technical Paper Publication. IMECE2018-86854

Waleed Ahmed, *United Arab Emirates University, Al Ain, United Arab Emir.*

4:06pm – Exploring the Use of Cinnamate Derivatives for Bulk-Mediated Photo-Alignment of Liquid Crystal Elastomers

Technical Presentation. IMECE2018-87111

Matthew L. Smith, Brian D. Simonich, Erik Johnsen, Alyssa VanZanten, *Hope College, Holland, MI, United States*

4:27pm – Effect of Constrained Groove Pressing on Mechanical Properties of Nitinol Alloy

Technical Paper Publication. IMECE2018-87295

Shanthan Kumar Padisala, Akhil Bhardwaj, Kamal Poluri, Amit Kumar Gupta, *BITS Pilani Hyderabad Campus, Hyderabad, India*

4:48pm – Influence of the Microstructure on the Creep Behaviour of Tin-Silver-Copper Solder

Technical Paper Publication. IMECE2018-87789

Pedro Ribeiro, Delfim Soares, *University of Minho, Guimarães, Portugal*, Maria Cerqueira, *Physics Department, Braga, Portugal*, Senhorinha Teixeira, Daniel Barros, Jose Teixeira, Pauline Capela, *University of Minho, Guimarães, Portugal*, Francisco Macedo, *University of Minho, Braga, Portugal*

5:09pm – A Three-Dimensional Nested Reinforcing Mesh in Elastomers for Crashworthy Applications

Technical Paper Publication. IMECE2018-88471

David J. Traina, Thomas C. Ekstrom, Owen F. Van Valkenburgh, Jean-Paul R. Wallis, David S. Schulman, Emily R. Mather, Nathan K. Yasuda, Frank J. Shih, *Seattle University, Seattle, WA, United States*

11-10 BIOINSPIRED MATERIALS, STRUCTURES AND APPLICATIONS

11-10-2 Bioinspired Materials, Structures and Applications

Third Floor, David L. Lawrence Convention Center, Room 333
3:45pm–5:30pm

Session Chair: Zhenhai Xia, *University of North Texas, Denton, TX, United States*

Session Co-Chair: Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*

3:45pm – Fiber Reorientation Behavior of Functional Graded Bouligand Architectures

Technical Presentation. IMECE2018-88222

Di Wang, *Purdue University, West Lafayette, IN, United States*, Alireza Zaheri, *Northwestern University, Evanston, IL, United States*, Benjamin Russell, *University of Cambridge, Cambridge, United Kingdom*, Horacio Espinosa, *Northwestern University, Evanston, IL, United States*, Pablo Zavattieri, *Purdue University, West Lafayette, IN, United States*

4:06pm – Bioinspired Microstructures and Guided Crack Propagation in Photopatterned Dual-Cure Polymer Networks

Technical Presentation. IMECE2018-89354

Lewis Cox, NIST, Boulder, CO, United States, **Adrienne Blevins**, Yifu Ding, University of Colorado Boulder, Boulder, CO, United States, **Jasper Drisko**, Jason Killgore, NIST, Boulder, CO, United States

4:27pm – Tunable Thermal Transport and Reversible Thermal Conductivity Switching in Topologically Networked Bio-inspired Materials

Technical Presentation. IMECE2018-89795

John A. Tomko, University of Virginia, Charlottesville, VA, United States, **Abdon Pena-Francesch**, Huihun Jung, Pennsylvania State University, State College, PA, United States, **Madhusudan Tyagi**, National Institute of Standards, Gaithersburg, MD, United States, **Benjamin Allen**, Pennsylvania State University, State College, PA, United States, **Melik Demirel**, Pennsylvania State University, University Park, PA, United States, **Patrick E. Hopkins**, University of Virginia, Charlottesville, VA, United States

4:48pm – Seedcoat-Inspired Architected Materials With Sutural Tessellation

Technical Presentation. IMECE2018-90038

Yaning Li, Chao Gao, Benjamin Hasseldine, University of New Hampshire, Durham, NH, United States, **Ling Li**, University of Virginia, Blacksburg, VA, United States, **James Weaver**, Harvard University, Cambridge, MA, United States

5:09pm – Experimental Analysis and Characterization of Bioplastic Materials Reinforced With Nanofibers and Nanoparticles

Technical Presentation. IMECE2018-88857

Mohammad Asaduzzaman Chowdhury, Bengir Ahmed Shuvho, Rajib Nandee, Uttam Kumar Debnath, Mohi Uddin Ahmed, Dhaka University of Engineering & Technology, Gazipur, Bangladesh, **Suman Das**, University of Saskatchewan, Saskatchewan, SK, Canada, **Md. Ruhul Amin**, Dhaka University of Engineering & Technology, Gazipur, Bangladesh

11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES

11-14-1 Multifunctional Composite Materials and Structures 1

Third Floor, David L. Lawrence Convention Center, Room 334
3:45pm–5:30pm

Session Chair: Jun Xu, Beihang University, Beijing, China

Session Co-Chair: Sha Yin, Beihang University, Beijing, China

3:45pm – Stochastic Modeling of a High Speed Composite Flywheel for Energy Storage

Technical Paper Publication. IMECE2018-86484

Matthew Riley, Rose-Hulman Institute of Technology, Terre Haute, IN, United States, **Justin Pettingill**, University of Idaho, Moscow, ID, United States

4:06pm – Determination of Key Influencing Factors on Thermal Conductivity Enhancement of Graphene Nano-Platelets Reinforced Epoxy

Technical Paper Publication. IMECE2018-86847

Maximilian Rieger, Balakrishnan Nagarajan, University of Alberta, Edmonton, AB, Canada, **Mario Vollmer**, Technical University of Munich, Garching, Germany, **Pierre Mertiny**, University of Alberta, Edmonton, AB, Canada

4:27pm – A Finite Element Study of the Impact of Interphase on the Damping Properties of Polymer Composites

Technical Presentation. IMECE2018-88066

Satyam Shukla, Shank S. Kulkarni, Alireza Tabarraei, University of North Carolina at Charlotte, Charlotte, NC, United States

4:48pm – Prediction of Gas Permeation in Polymeric Materials Used in Oil and Gas Industry

Technical Paper Publication. IMECE2018-87211

Nooshin Nassr, University of Oklahoma, Hackensack, NJ, United States, **Zahed Siddique**, University of Oklahoma, Norman, OK, United States

5:09pm – Numerical Analysis About Hierarchical Lattice Materials With Different Constructions

Technical Presentation. IMECE2018-89155

Haoyu Chen, Sha Yin, Xiang Gao, Beihang University, Beijing, China

WEDNESDAY, NOVEMBER 14

11-9 MATERIALS PROCESSING AND CHARACTERIZATION

11-9-5 Materials Processing and Characterization V
Third Floor, David L. Lawrence Convention Center, Room 334
10:00am–11:45am

Session Chair: Muhammad Rahman, *Wichita State University, Wichita, KS, United States*

Session Co-Chair: Philippe Geubelle, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10:00am – Advanced Recycled Materials for Economic Production of Fire Resistant Fabrics
Technical Paper Publication. IMECE2018-88640
Tamseel Ahmed, Zaara Ali, Muhammad Rahman, Eylem Asmatulu, Wichita State University, Wichita, KS, United States

10:21am – Processing and Characterization of Filler Silicon Carbide, Aluminum Oxide, and Titanium Oxide Particles on Glass Fiber Hybrid Composite
Technical Presentation. IMECE2018-88852
Mohammad Asaduzzaman Chowdhury, Uttam Kumar Debnath, Benjir Ahmed Shuvho, Rajib Nandee, Dhaka University of Engineering and Technology, Gazipur, Gazipur, Bangladesh, Suman Das, University of Saskatchewan, Saskatchewan, SK, Canada, Atiqur Rahman, Bangladesh Road Transport Authority, Dhaka, Bangladesh

10:42am – Faster, Energy-Efficient Manufacturing of Fiber-Reinforced Composites Using Frontal Polymerization
Technical Presentation. IMECE2018-88994
Philippe Geubelle, Elyas Goli, Sagar Vyas, University of Illinois at Urbana-Champaign, Urbana, IL, United States

11:03am – Trade-off between Boron Doping and Stiffness, Strength and Damage Tolerance of Graphene
Technical Presentation. IMECE2018-89089
Zhaohe Dai, University of Texas at Austin, Austin, TX, United States

11:24am – In Situ Characterization of Residual Stress and Primary Creep in NiW Thin Films Using Wafer Curvature
Technical Presentation. IMECE2018-89821
Prince Singh, Ryan Pocratsky, Maarten P. De Boer, Carnegie Mellon University, Pittsburgh, PA, United States

11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES

11-14-2 Multifunctional Composite Materials and Structures 2

Third Floor, David L. Lawrence Convention Center, Room 335
10:00am–11:45am

Session Chair: Akio Yonezu, *Chuo University, Tokyo, Japan*

Session Co-Chair: Jun Xu, *Beihang University, Beijing, China*

10:00am – Effect of Porous Structure on Tensile Deformation of Porous Polymer Membranes: FEM Computations of Periodic and Random Pore Structures
Technical Presentation. IMECE2018-86656
Kanako Emori, Yoshiki Nishiyama, Takumi Nagakura, Akio Yonezu, Chuo University, Tokyo, Japan

10:21am – Deformation Modeling of Porous Polymer Materials With 3D Random Pore Structure
Technical Presentation. IMECE2018-86492
Hiroshi Kishida, Shugo Fushimi, Takumi Nagakura, Kanako Emori, Akio Yonezu, Chuo University, Tokyo, Japan

10:42am – Anisotropic Deformation Behavior of Polymeric Microfiltration Membranes: Experiment and FEM Modeling
Technical Presentation. IMECE2018-86655
Takumi Nagakura, Kanako Emori, Hiroshi Kishida, Akio Yonezu, Chuo University, Tokyo, Japan

11:03am – Bonding Strength Evaluation of Al Alloy and Epoxy Resin by Using Laser Induced Ultrasonic Wave
Technical Presentation. IMECE2018-86658
Yusaku Saito, Takeshi Yamada, Akio Yonezu, Chuo University, Tokyo, Japan

11:24am – Nano Surface Adhesion and Deformation Behaviors of Polymer Blend Membranes for Water Purification by Using Atomic Force Microscopy
Technical Presentation. IMECE2018-87302
Kazunori Miyamoto, Daiki Ikeshima, Kenji Furuya, Hiroshi Yamamura, Akio Yonezu, Chuo University, Tokyo, Japan

11-18 PHASE TRANSFORMATIONS IN MATERIALS PROCESSING

11-18-1 Phase Transformations in Materials Processing I: Additive Manufacturing

Third Floor, David L. Lawrence Convention Center, Room 336
10:00am–11:45am

Session Chair: Mohsen Asle Zaeem, *Colorado School of Mines, Golden, CO, United States*

10:00am – Additive Manufacturing, 3D Printing, Porosity and Synchrotron Experiments
Invited Presentation. IMECE2018-86665
Anthony Rollett, Carnegie Mellon University, Pittsburgh, PA, United States

10:21am – An Overview of Additive Manufacturing of Functional Magnetic Shape Memory Alloys and Metamagnetic Materials With Magnetocaloric Properties

Invited Presentation. IMECE2018-88140

Markus Chmielus, Jakub Toman, Amir Mostafaei, Erica Stevens, Katerina A. Kimes, *University of Pittsburgh, Pittsburgh, PA, United States*

10:42am – Optimizing Additively-Manufactured Inconel 625 for Reliable Mechanical Properties and Corrosion Resistance

Invited Presentation. IMECE2018-88848

Mark Stoudt, Richard Ricker, Eric Lass, *National Institute of Standards and Technology, Gaithersburg, MD, MD, United States*

11:03am – Nano-Scale Spatiotemporal Resolution Transmission Electron Microscopy of Multicomponent Alloy Microstructure Evolution During Rapid Thermal Transients

Invited Presentation. IMECE2018-86718

Jorg Wiezorek, *University of Pittsburgh, Pittsburgh, PA, United States*, Joseph McKeown, *Lawrence Livermore National Laboratory, Livermore, CA, United States*, Vishwanadh Bathula, *University of Pittsburgh, Pittsburgh, PA, United States*

11:24am – Binder Jet 3D Printing of Metamagnetic Ni-Mn-Based Alloys for Magnetocaloric Applications

Technical Presentation. IMECE2018-88204

Erica Stevens, Katerina A. Kimes, Aaron Acierno, Rafael Rodriguez, Amir Mostafaei, Markus Chmielus, *University of Pittsburgh, Pittsburgh, PA, United States*

11-9 MATERIALS PROCESSING AND CHARACTERIZATION

11-9-6 Materials Processing and Characterization VI
Third Floor, David L. Lawrence Convention Center, Room 334
1:45pm–3:30pm

Session Chair: Raghu Prakash, *Indian Institute of Technology Madras, Chennai, India*

Session Co-Chair: Nicholas J. Morris, *UES, Inc./AFRL, Dayton, OH, United States*

1:45pm – PH level of Pore Solution in Alkali Activated Fly-Ash Geopolymer Concrete and Its Effect on ASR of Aggregates With Wide Silicate Contents

Technical Presentation. IMECE2018-89053

Shree Paudel, Mijia Yang, *North Dakota State University, Fargo, ND, United States*

2:06pm – Influence of Steel Fiber on Mechanical Properties of Elevated Temperature Cured Fly-Ash Based Geopolymer Mortar

Technical Presentation. IMECE2018-89054

Shree Paudel, Mijia Yang, *North Dakota State University, Fargo, ND, United States*

2:27pm – Correlating Chemistry and Mechanics to Design Liquid Metal Nanoparticles for Self-Healing Electronics

Technical Presentation. IMECE2018-89549

Nicholas J. Morris, Zachary J. Farrell, *UES, Inc./AFRL, Dayton, OH, United States*, Christopher E. Tabor, *Air Force Research Laboratory, WPAFB, OH, United States*

2:48pm – Scalable Manufacturing Routes to Develop Boron Nitride Nanotubes Based Metal Matrix Composites

Technical Presentation. IMECE2018-89722

Pranjal Nautiyal, Benjamin Boesl, Arvind Agarwal, *Florida International University, Miami, FL, United States*

3:09pm – Assessing Interlayer Adhesion Degradation in Photovoltaic Backsheets Using the Single Cantilever Beam Test

Technical Presentation. IMECE2018-89668

Scott Julien, *Northeastern University, Boston, MA, United States*, Xiaohong Gu, Jae Hyun Kim, *National Institute of Standards and Technology, Gaithersburg, MD, United States*, Kai Tak Wan, *Northeastern University, Boston, MA, United States*

11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES

11-14-3 Multifunctional Composite Materials and Structures 3

Third Floor, David L. Lawrence Convention Center, Room 335
1:45pm–3:30pm

Session Chair: Sha Yin, *Beihang University, Beijing, China*

Session Co-Chair: Akio Yonezu, *Chuo University, Tokyo, Japan*

1:45pm – Thermal Resistance of Polystyrene-Seeded Concrete for Better Insulative Value

Technical Paper Publication. IMECE2018-88661

Chris Kobus, Michael Huysen, Ryan Piper, J. David Schall, *Oakland University, Rochester, MI, United States*, Laila Guessous, *Oakland University, Bloomfield, MI, United States*, Xia Wang, *Oakland University, Rochester, MI, United States*

2:06pm – Ordered Carbon Nanotube-Polymer Composites From Lyotropic Liquid Crystal Templating

Technical Presentation. IMECE2018-89476

Shanju Zhang, *Cal Poly, San Luis Obispo, CA, United States*

2:27pm – Mechanical and Morphological Properties of Nickel-Plated Luffa Sponge

Technical Presentation. IMECE2018-89946

Huitian Wang, Haoyu Chen, Zihan Hu, Yaobo Wu, Sha Yin, *Beihang University, Beijing, China*

2:48pm – Investigating the Mechanical Behaviour of Al6063 Stir Cast With Coconut Husk

Technical Presentation. IMECE2018-88953

Patrick Adebisi Olusegun Adegbuyi, *Lagos State University Lagos, Lagos, Nigeria*

3:09pm – Micromechanical Modeling of Nonlinear Responses of Active Woven Composites
Technical Presentation. IMECE2018-88354
Wen-chen Lin, Chien-hong Lin, *National Cheng Kung University, Tainan, Taiwan*

11-18 PHASE TRANSFORMATIONS IN MATERIALS PROCESSING

11-18-2 Phase Transformations in Materials Processing II: Microstructures and Properties
Third Floor, David L. Lawrence Convention Center, Room 336
1:45pm–3:30pm

Session Chair: Mohsen Asle Zaeem, *Colorado School of Mines, Golden, CO, United States*

Session Co-Chair: Siddhartha Pathak, *University of Nevada, Reno, Reno, NV, United States*

1:45pm – New Insights Into Metallic Alloy Microstructural Evolution by In Situ Characterization
Invited Presentation. IMECE2018-88880
Amy Clarke, *Colorado School of Mines, Golden, CO, United States*

2:06pm – Structure and Properties of bcc Mg Synthesized Using Interface Strain Engineering
Invited Presentation. IMECE2018-88968
Siddhartha Pathak, Manish Jain, *University of Nevada, Reno, Reno, NV, United States*, Marko Knezevic, *University of New Hampshire, Durham, NH, United States*, Nenad Velisavljevic, *Los Alamos National Laboratory, Los Alamos, NM, United States*, Nathan Mara, *University of Minnesota, Minneapolis, MN, United States*, Irene Beyerlein, *University of California, Santa Barbara, Santa Barbara, CA, United States*

2:27pm – Understanding Nucleation Phenomena and Phase Formation in Rapid Solidification of Al and Al-Cu Alloys
Technical Presentation. IMECE2018-88934
Avik Mahata, *Missouri S&T, Rolla, MO, United States*, Michael Baskes, *University of California, San Diego, La Jolla, CA, United States*, Mohsen Asle Zaeem, *Colorado School of Mines, Golden, CO, United States*

2:48pm – Effect of Non-Equilibrium Cooling on Phase Transformations and Morphology of Second Phases in Al-Rich Al-Cu Alloys
Technical Presentation. IMECE2018-87574
Vishwanadh Bathula, Subarna Khanal, Jorg Wiezorek, *University of Pittsburgh, Pittsburgh, PA, United States*

3:09pm – A Comparative Assessment of the Structural, Elastic and Electronic Properties of Nb₃Pt and NbPt₃ Phases Through First-Principles Study
Technical Paper Publication. IMECE2018-86911
Romeo Sephyrin Fono-Tamo, Tien-Chien Jen, *University of Johannesburg, Johannesburg, South Africa*, Oliver Bhila, *University of South Africa, Johannesburg, Gauteng, South Africa*

11-6 NANOENGINEERED, HIERARCHICAL, MULTI-SCALE MATERIALS AND STRUCTURES

11-6-1 Nanoengineered, Hierarchical, Multi-Scale Materials and Structures
Third Floor, David L. Lawrence Convention Center, Room 336
3:45pm–5:30pm

Session Chair: Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

3:45pm – Integrating an Analytical Uncertainty Quantification Approach to Multi-Scale Modeling of Nanocomposites
Technical Paper Publication. IMECE2018-86227
Pinar Acar, *Virginia Tech, Blacksburg, VA, United States*

4:06pm – Simulation of Liquid Crystal Polymer Directionality During Cast Film Extrusion
Technical Paper Publication. IMECE2018-86855
Anthony Sullivan, Anil Saigal, Michael Zimmerman, *Tufts University, Medford, MA, United States*

4:27pm – Hydrostatic Compression Constitutive Material Modeling of Two-Phase Cement Paste Composite Material Chemistry Structures
Technical Presentation. IMECE2018-89136
Ingrid Padilla Espinosa, Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*, Wayne Hodo, *U.S. Army - ERDC, Vicksburg, MS, United States*, John Rivas Murillo, *North Carolina A&T State University, Greensboro, NC, United States*

4:48pm – Multiscale Finite Element Modeling of Ultra-High Performance Concrete
Technical Presentation. IMECE2018-89167
K.E. Bryan, Y. Hammi, *Mississippi State University, Starkville, MS, United States*, M.Q. Chandler, *USACE-ERDC, Vicksburg, MS, United States*, R.D. Moser, *U.S. Army Engineer Research and Development Center, Vicksburg, MS, United States*, M.N. Burcham, *Mississippi State University, Huntsville, AL, United States*, D. Scott, *U.S. Army Research and Development Center, Vicksburg, MS, United States*, T.W. Stone, Mark Horstemeyer, *Mississippi State University, Starkville, MS, United States*

5:09pm – 3D Graphene Foam for Engineering Advanced Composites and Metamaterials
Technical Presentation. IMECE2018-89688
Pranjal Nautiyal, Benjamin Boesl, Arvind Agarwal, *Florida International University, Miami, FL, United States*

11-13 MULTIPHYSICS AND MULTISCALE MODELING OF LITHIUM-ION BATTERIES

11-13-1 Multiphysics and Multiscale Modeling of Lithium-Ion Batteries

Third Floor, David L. Lawrence Convention Center, Room 334
3:45pm–5:30pm

Session Chair: Jun Xu, Beihang University, Beijing, China

Session Co-Chair: Binghe Liu, Beijing University of Aeronautics and Astronautics, Beijing, China

3:45pm – A Detailed Mechanical Model of Lithium-Ion Pouch Batteries

Technical Presentation. IMECE2018-89465

Juner Zhu, Massachusetts Institute of Technology, Cambridge, MA, United States, **Wei Li**, Tsinghua University, Beijing, Beijing, China, **Tomasz Wierzbicki**, Massachusetts Institute of Technology, Cambridge, MA, United States

4:06pm – Multiphysics Modeling of 18650 Battery Under Mechanical Loading

Technical Presentation. IMECE2018-89129

Chunhao Yuan, Jun Xu, Lubing Wang, Beihang University, Beijing, China

4:27pm – Assessing Battery Safety Using a Combined Simulation Approach From Cell to Vehicle Level

Technical Presentation. IMECE2018-89190

Bernhard Brunsteiner, AVL, Graz, Austria

4:48pm – State-of-Charge Dependence of Mechanical Response of Lithium-Ion Batteries: A Result of Internal Stress

Technical Presentation. IMECE2018-89392

Wei Li, Xia Yong, Tsinghua University, Beijing, Beijing, China, **Juner Zhu**, Massachusetts Institute of Technology, Cambridge, MA, United States, **Hailing Luo**, Tsinghua University, Beijing, China

5:09pm – A Multiscale and Multiphysics Model for Lithium-Ion Full Cells With Silicon-Containing Anodes

Technical Presentation. IMECE2018-89125

Binghe Liu, Beijing University of Aeronautics and Astronautics, Beijing, China, **Jun Xu**, Beihang University, Beijing, China, **Hanqing Jiang**, Arizona State University, Tempe, AZ, United States

11-20 RECENT DEVELOPMENTS IN TRIBOLOGY

11-20-1 Recent Developments in Tribology

Third Floor, David L. Lawrence Convention Center, Room 335
3:45pm–5:30pm

Session Chair: Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States

Session Co-Chair: Hong Guo, Rochester Institute of Technology, Rochester, NY, United States

3:45pm – The Effects of Single-Walled Carbon Nanotubes and Ionic Liquids in Reduction of Friction and Wear

Technical Paper Publication. IMECE2018-86703

Hong Guo, John Ackerman, Steven Keil, Ivan Puchades, Brian Landi, Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States

4:06pm – Effect of Carbon Nanotube-Phosphinate Ionic Liquid Thin Boundary Layer on the Tribological Behavior of Aluminum Alloy in Steel-on-Aluminum Contact

Technical Paper Publication. IMECE2018-86875

Miguel Gutierrez, Michael Gydesen, Caitlin Marcellus, Ivan Puchades, Brian Landi, Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States

4:27pm – Estimation of Energy Conservation in Internal Combustion Engine Vehicles Using Ionic Liquid as an Additive

Technical Paper Publication. IMECE2018-87002

Sameer A. Magar, Hong Guo, Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States

4:48pm – Surface Characterization of Trim Dies and Trimmed Edges in Sheet Metal Shearing

Technical Presentation. IMECE2018-89542

Xin Wu, Ameer Al-Shawk, Wayne State University, Detroit, MI, United States

5:09pm – Ionic Liquids as Additives of Cutting Fluids to Reduce Machine Tool Friction and Wear

Technical Paper Publication. IMECE2018-86810

Patricia Iglesias, Christopher Ferri, Sydney Lizarazo, Michael Troise, Rochester Institute of Technology, Rochester, NY, United States

TRACK 12 MECHANICS OF SOLIDS, STRUCTURES AND FLUIDS

- 12-1-1: Mechanics of Soft Materials: Structure
- 12-1-2: Mechanics of Soft Materials: Gels/Active Materials 1
- 12-1-3: Mechanics of Soft Materials: Gels/Active Materials 2
- 12-1-4: Mechanics of Soft Materials: Constitutive Modeling
- 12-1-5: Mechanics of Soft Materials: Bioinspiration and Biomimetics
- 12-1-6: Mechanics of Soft Materials: Electro/magneto/Chemo-Mechanics
- 12-1-7: Mechanics of Soft Materials: Characterization
- 12-1-8: Mechanics of Soft Materials: Fracture, Dissipation, and Self-Healing
- 12-2-1: 3D Printing of Novel Materials
- 12-2-2: Mechanics of 3D Printed Materials
- 12-3-1: Mechanical Characterization in Extreme Environments I
- 12-3-2: Mechanical Characterization in Extreme Environments II
- 12-3-3: Mechanical Characterization in Extreme Environments III
- 12-4-1: Mechanics of Adhesion and Friction
- 12-4-2: Mechanics of Adhesion and Friction
- 12-4-3: Mechanics of Adhesion and Friction
- 12-5-1: Quantitative Visualization Related to Fracture & Crack Growth Processes
- 12-6-1: In-Situ Techniques in Experimental Mechanics
- 12-7-1: Multiscale Models and Experimental Techniques for Composite Materials and Structures
- 12-7-2: Multiscale Models and Experimental Techniques for Composite Materials and Structures
- 12-7-3: Multiscale Models and Experimental Techniques for Composite Materials and Structures
- 12-8-1: Multi-Scale Computations in Fluids, Structures, and Materials 1
- 12-8-2: Multi-Scale Computations in Fluids, Structures, and Materials 2
- 12-8-3: Multi-Scale Computations in Fluids, Structures, and Materials 3
- 12-10-1: Modeling and Experiments in Nanomechanics and Nanomaterials 1
- 12-10-2: Modeling and Experiments in Nanomechanics and Nanomaterials 2
- 12-10-3: Modeling and Experiments in Nanomechanics and Nanomaterials 3
- 12-10-4: Modeling and Experiments in Nanomechanics and Nanomaterials 4
- 12-12-1: Mechanics of Thin-Film and Multi-Layer Structures
- 12-12-2: Mechanics of Thin-Film and Multi-Layer Structures
- 12-12-3: Mechanics of Thin-Film and Multi-Layer Structures
- 12-12-4: Mechanics of Thin-Film and Multi-Layer Structures
- 12-13-1: Recent Advances and Applications in Meshfree and Particle Methods
- 12-13-2: Recent Advances and Applications in Meshfree and Particle Methods
- 12-14-1: Plastic Anisotropy Modeling
- 12-14-2: Multi-Scale Modelling of Plastic Anisotropy
- 12-14-3: Numerical Modeling with Applications to Forming
- 12-14-4: Experimental and Theoretical Models for Anisotropic Plasticity and Fracture
- 12-15-1: Inaugural Symposium on the Constitutive Modeling of the Mechanical Behavior and Performance of Electronic, Photonic, MEMS, and NEMS Materials, Assemblies, Packages, Modules, and Systems
- 12-16-1: Multiscale Modeling and Experimentation of Geomaterials
- 12-16-2: Multiscale Modeling and Experimentation of Geomaterials
- 12-17-1: Failure and Fracture of Additively Manufactured Materials and Structures – 1
- 12-17-2: Failure and Fracture of Additively Manufactured Materials and Structures – 2
- 12-18-1: Computational Modeling of Extreme Events
- 12-18-2: Computational Modeling of Extreme Events
- 12-19-1: Computational Fluid-Structure Interaction
- 12-19-2: Computational Fluid-Structure Interaction
- 12-19-3: Computational Fluid-Structure Interaction
- 12-19-4: Computational Fluid-Structure Interaction
- 12-20-1: Multiscale Mechanics of Ductile Failure
- 12-20-2: Multiscale Mechanics of Ductile Failure
- 12-21-1: Fatigue Modeling in Engineering Materials
- 12-21-2: Fatigue Modeling in Engineering Materials
- 12-21-3: Material Model and Fracture Theory Development
- 12-21-4: Meso-Scale Modeling and Material Fracture Characterization
- 12-21-5: Uncertainty Modeling in Fracture and Fatigue
- 12-22-1: Deformation and Failure of Multifunctional Materials
- 12-22-2: Deformation and Failure of Multifunctional Materials
- 12-25-1: Mechanics and Design of Cellular Materials
- 12-25-2: Mechanics and Design of Cellular Materials
- 12-26-1: Mechanics of Soft Materials and Soft Robots
- 12-26-2: Mechanics of Soft Materials and Soft Robots
- 12-26-3: Mechanics of Soft Materials and Soft Robots
- 12-26-4: Mechanics of Soft Materials and Soft Robots
- 12-26-5: Mechanics of Soft Materials and Soft Robots
- 12-27-1: Multifunctional and Micro/Nano-Structured Materials: Modeling and Characterization (I)
- 12-27-2: Multifunctional and Micro/Nano-Structured Materials: Modeling and Characterization (II)
- 12-27-3: Multifunctional and Micro/Nano-Structured Materials: Modeling and Characterization (III)
- 12-27-4: Multifunctional and Micro/Nano-Structured Materials: Modeling and Characterization (IV)
- 12-28-1: Instabilities in Solids and Structures: Mechanics of Slender Solids
- 12-28-2: Instabilities in Solids and Structures: Numerical/Analytical Stability
- 12-28-3: Instabilities in Solids and Structures: Active and Soft Materials
- 12-28-4: Instabilities in Solids and Structures: Stability of Composites, Foams/Open-Cell Materials
- 12-28-5: Instabilities in Solids and Structures: Phase Transformations/Transitions and Multi-Stability
- 12-29-1: Peridynamic Modelling and Analysis
- 12-29-2: Peridynamics for Composites, Fracture, and Corrosion Damage
- 12-30-1: Symposium on Multiphysics Simulations and Experiments for Solids
- 12-30-2: Symposium on Multiphysics Simulations and Experiments for Solids
- 12-31-1: Design of Mechanical Metamaterials
- 12-31-2: Functionality of Mechanical Metamaterials
- 12-31-3: Mechanics of Mechanical Metamaterials
- 12-31-4: Reconfigurable Mechanical Metamaterials
- 12-32-1: High-Performance Nanostructural Materials and Nanocomposites
- 12-33-1: Congress-Wide Symposium on NDE & SHM – Nondestructive Characterization of Solids, Structures and Fluids
- 12-35-1: Congress-Wide Symposium on NDE & SHM – Active and Passive Health Monitoring of Structures
- 12-36-1: Keynote Lectures on Computational Mechanics – 1
- 12-38-1: Young Medalist Symposium
- 12-38-2: Young Medalist Symposium
- 12-39-1: Drucker Medal Symposium
- 12-39-2: Drucker Medal Symposium
- 12-39-3: Drucker Medal Symposium
- 12-40-1: Mechanics of Solids, Structures and Fluids Plenary I
- 12-40-2: Mechanics of Solids, Structures and Fluids Plenary II
- 12-41-1: Dynamic Failure of Materials and Structures
- 12-41-2: Dynamic Failure of Materials and Structures

ACKNOWLEDGMENT

Track Organizers

Yuri Bazilevs, *University of California, San Diego, United States*
Pradeep Guduru, *Brown University, United States*

Topic Organizers

Shawn Chester, *New Jersey Institute of Technology, United States*
Shengqiang Cai, *UC San Diego, United States*
Qiming Wang, *University of Southern California, United States*
Howon Lee, *Rutgers University, United States*
Qiming Wang, *University of Southern California, United States*
Kai Yu, *University of Colorado – Denver, United States*
Ryan Berke, *Utah State University, United States*
Natasha Vermaak, *Lehigh University, United States*
Owen Kingstedt, *University of Utah, United States*
Jianliang Xiao, *University of Colorado Boulder, United States*
Chenglin Wu, *Missouri University of Science and Technology, United States*
Brian Bush, *National Institute of Standards and Technology, United States*
Leslie Lamberson, *Drexel University, United States*
Ali Ghahremaninezhad, *University of Miami, United States*
Charles Wojnar, *Missouri S&T, United States*
Dianyun Zhang, *University of Connecticut, United States*
Caglar Oskay, *Vanderbilt University, United States*
Evan Pineda, *NASA Glenn Research Center, United States*
Yozo Mikata, *Bechtel, United States*
Jeffrey Kysar, *Columbia University, United States*
Shuodao Wang, *Oklahoma State University, United States*
Huanyu (Larry) Cheng, *Pennsylvania State University, United States*
Jizhou Song, *Zhejiang University, China*
Sheng-Wei Chi, *University of Illinois at Chicago, United States*
Jiun-Shyan Chen, *University of California, San Diego, United States*
Michael Hillman, *Pennsylvania State University, United States*
C.T. Wu, *LSTC, United States*
Oana Cazacu, *University of Florida, United States*
H. Eliot Fang, *Sandia National Laboratories, United States*
Martin Ostoja-Starzewski, *University of Illinois Urbana, United States*
Ephraim Suhir, *Portland State University, United States*
Abhijit Dasgupta, *CALCE, University of Maryland, United States*
M.Q. Chandler, *USACE-ERDC, United States*
Jesse Sherburn, *US Army Engineer Research and Development Center, United States*
Paul Allison, *University of Alabama, United States*
Ashfaq Adnan, *University of Texas Arlington, United States*
Jason Roth, *U.S. Army - ERDC, United States*
Joe Bishop, *Sandia National Labs, United States*
Artem Korobenko, *University of Calgary, Canada*
Ming-Chen Hsu, *Iowa State University, United States*
Kenji Takizawa, *Waseda University, Japan*
Tayfun Tezduyar, *Rice University, United States*
Justin Wilkerson, *Texas A&M University, United States*
Ankit Srivastava, *Texas A&M University, United States*
Shailendra Joshi, *University of Houston, United States*
Huijuan Zhao, *Clemson University, United States*
Gang Li, *Clemson University, United States*
Qingda Yang, *University of Miami, United States*
Mohsen Asle Zaeem, *Colorado School of Mines, United States*
Theocharis Baxevanis, *University of Houston, United States*
Dimitris Lagoudas, *Texas A&M University, United States*

Ibrahim Karaman, *Texas A & M University, United States*
Charles Wojnar, *Missouri S&T, United States*
Russell Mailen, *Auburn University, United States*
Muhammad Ali, *Ohio University, United States*
Huanyu (Larry) Cheng, *Pennsylvania State University, United States*
Shaoming Qu, *Zhejiang University, Zhejiang, China*
Tiefeng Li, *Zhejiang University, China*
Xin-Lin Gao, *Southern Methodist University, United States*
Vinu Unnikrishnan, *University of Alabama, United States*
Haifeng Zhao, *Chinese Academy of Sciences, China*
Ryan Elliott, *University of Minnesota, United States*
Edmundo Corona, *Sandia National Laboratories, United States*
Dai Okumura, *Osaka University, Japan*
Kostas Danas, *LMS, CNRS, Ecole Polytechnique, France*
Florin Bobaru, *University of Nebraska-Lincoln, United States*
Ibrahim Guven, *Virginia Commonwealth University, United States*
Erdogan Madenci, *University of Arizona, United States*
Pablo Seleson, *Oak Ridge National Laboratory, United States*
Stewart Silling, *Sandia National Lab, United States*
Qian Qian, *University of Texas at Dallas, United States*
Hanqing Jiang, *Arizona State University, United States*
Harold Park, *Boston University, United States*
Gang Li, *Clemson University, United States*
Xianqiao Wang, *University of Georgia, United States*
Jongmin Shim, *University at Buffalo, United States*
Lifeng Wang, *Stony Brook University, United States*
Jie Yin, *Temple University, United States*
Yaning Li, *University of New Hampshire, United States*
Sung Kang, *Johns Hopkins University, United States*
Eduard Karpov, *University of Illinois at Chicago, United States*
Jaehyung Ju, *Shanghai Jiao Tong University, China*
Yuris Dzenis, *University of Nebraska, United States*
Dimitry Papkov, *University of Nebraska-Lincoln, United States*
Mohammad Naraghi, *Texas A & M University, United States*
Sourav Banerjee, *University of South Carolina, United States*
Andrei Zagrai, *New Mexico Institute of Mining & Technology, United States*
Yanfeng Shen, *Shanghai Jiao Tong University, China*
Sridhar Santhanam, *Villanova University, United States*
Tribikram Kundu, *University of Arizona, United States*
Scott Bland, *NextGen Aeronautics, United States*
Qian Qian, *University of Texas at Dallas, United States*
Ashfaq Adnan, *University of Texas Arlington, United States*
Caglar Oskay, *Vanderbilt University, United States*
L. Roy Xu, *University of New Mexico, United States*
Jun Xu, *Beihang University, China*

Session Organizers

Shengqiang Cai, *UC San Diego, United States*
Shawn Chester, *New Jersey Institute of Technology, United States*
Qiming Wang, *University of Southern California, United States*
Sung Kang, *Johns Hopkins University, United States*
Robert L. Lowe, *University of Dayton, United States*
Aurelie Azoug, *Oklahoma State University, United States*
Kai Yu, *University of Colorado – Denver, United States*
Owen Kingstedt, *University of Utah, United States*
Natasha Vermaak, *Lehigh University, United States*
Ryan Berke, *Utah State University, United States*
Jianliang Xiao, *University of Colorado Boulder, United States*

Glaucio Paulino, *University of Illinois, United States*
Karel Matouš, *University of Notre Dame, United States*
Huijuan Zhao, *Clemson University, United States*
Ahmad Najafi, *Drexel University, United States*
Jeffrey Kysar, *Columbia University, United States*
Scott Price, *G E Research Center, United States*
Changhong Ke, *State University of NY, United States*
Yingchao Yang, *University of Maine, United States*
George Voyiadjis, *Louisiana State University, United States*
Tarek Ragab, *Arkansas State University, United States*
Yashashree Kulkarni, *University of Houston, United States*
Shuodao Wang, *Oklahoma State University, United States*
Sheng-Wei Chi, *University of Illinois at Chicago, United States*
Pablo Seleson, *Oak Ridge National Laboratory, United States*
C.T. Wu, *LSTC, United States*
Michael Hillman, *Pennsylvania State University, United States*
William Scherzinger, *Sandia National Laboratories, United States*
Brian Lester, *Sandia National Laboratories, United States*
Nitin Chandola, *University of Florida, United States*
William Lawrimore, *US Army Engineer Research and Development Center, United States*
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Justin Wilkerson, *Texas A&M University, United States*
Ke Li, *Schlumberger, TX, United States*
Huijuan Zhao, *Clemson University, United States*
Rui Zhang, *University of Texas at Dallas, United States*
Qingda Yang, *University of Miami, United States*
Alireza Amirkhizi, *University of Massachusetts, Lowell, United States*
Kazem Alidoost, *University of Illinois at Urbana-Champaign, United States*
Xiaoyao Peng, *Carnegie Mellon University, United States*
Sevan Goenezen, *Texas A&M University, United States*
Bahador Bahmani, *University of Tennessee, Knoxville, United States*
Haifeng Zhao, *Chinese Academy of Sciences, China*
Vinu Unnikrishnan, *University of Alabama, United States*
Stavros Gaitanaros, *Johns Hopkins University, United States*
Pedro Reis, *EPFL (Switzerland), Switzerland*
Xin Ning, *Pennsylvania State University, United States*
Nicolas Triantafyllidis, *Ecole Polytechnique, France*
Stelios Kyriakides, *University of Texas, United States*
Dai Okumura, *Nagoya University, Japan*
Victor Lefevre, *Northwestern University, United States*
George Kardomateas, *Georgia Institute of Technology, United States*
Katia Bertoldi, *Harvard University, United States*
Hiro Tanaka, *Osaka University, Japan*
Rui Zhang, *University of Texas at Dallas, United States*
Jongmin Shim, *University at Buffalo, United States*
Jie Yin, *Temple University, United States*
Jaehyung Ju, *Shanghai Jiao Tong University, China*
Eduard Karpov, *University of Illinois at Chicago, United States*
Jie Yin, *Temple University, United States*
Yaning Li, *University of New Hampshire, United States*
Soumik Banerjee, *Washington State University, United States*
Sridhar Santhanam, *Villanova University, United States*
Yihui Zhang, *Tsing Un China*
Dennis Kochmann, *ETH*
Wei Cai, *Stanford*

TRACK 12 MECHANICS OF SOLIDS, STRUCTURES AND FLUIDS

MONDAY, NOVEMBER 12

12-1 MECHANICS OF SOFT MATERIALS

12-1-1 Mechanics of Soft Materials: Structure

Third Floor, David L. Lawrence Convention Center, Room 333
9:45am–11:30am

Session Chair: Shengqiang Cai, *University of California San Diego, La Jolla, CA, United States*

9:45am – Origomu: The Geometry and Mechanics of Folding Polymer Films and Shells

Invited Presentation. IMECE2018-89449

Ryan Hayward, *University of Massachusetts Amherst, Amherst, MA, United States*

10:27am – Origami/Kirigami-Guided Morphing of Composite Sheets

Technical Presentation. IMECE2018-89357

Jianxun Cui, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Felipe Poblete**, **Yong Zhu**, *North Carolina State University, Raleigh, NC, United States*

10:48am – Nonlinear Mechanics of Soft Substrates With Surface Topology

Technical Presentation. IMECE2018-88272

Ranajay Ghosh, **Hossein Ebrahimi**, **Hessein Ali**, *University of Central Florida, Orlando, FL, United States*

11:09am – Deformation of Radially Symmetric Shape Memory Polymer Discs

Technical Presentation. IMECE2018-89289

Russell Mailen, *Auburn University, Auburn, AL, United States*, **Catherine Wagner**, **Jan Genzer**, **Michael D. Dickey**, *North Carolina State University, Raleigh, NC, United States*, **Mohammed Zikry**, *North Carolina State University, Raleigh, NC, United States*

12-6 IN-SITU TECHNIQUES IN EXPERIMENTAL MECHANICS

12-6-1 In-Situ Techniques in Experimental Mechanics

Fourth Floor, David L. Lawrence Convention Center, Room 402
9:45am–11:30am

Session Chair: Ryan Berke, *Utah State University, Logan, UT, United States*

9:45am – Experimental Characterization of Polymer Films and Fabrics at Intermediate Strain Rates

Technical Presentation. IMECE2018-89739

Alireza Amirkhizi, **Fateme Aghighi**, **David Roux**, *University of Massachusetts, Lowell, Lowell, MA, United States*

10:06am – Real-Time Visualization of GaN/AlGaIn High Electron Mobility Transistor Failure at Off-State

Technical Presentation. IMECE2018-89116

Zahabul Islam, *Pennsylvania State University, State College, PA, United States*, **Md. Haque**, *Pennsylvania State University, University Park, PA, United States*, **Nicholas Glavin**, *Air Force Research Laboratory, Ohio, OH, United States*

10:27am – Characterization of the Micromechanical Evolution of Ti-7Al Under the Cyclic Loading Using High Energy X-Ray Diffraction Microscopy

Technical Presentation. IMECE2018-89152

Rachel E. Lim, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Darren C. Pagan**, *Cornell High Energy Synchrotron Source, Ithaca, NY, United States*, **Vahid Tari**, **Yufeng Shen**, **Robert M. Suter**, **Anthony D. Rollett**, *Carnegie Mellon University, Pittsburgh, PA, United States*

10:48am – In Situ Observation on Temperature Dependence of Martensitic Transformation and Plastic Deformation in Superelastic NiTi Alloy

Technical Presentation. IMECE2018-88828

Yao Xiao, **Pan Zeng**, **Liping Lei**, *Tsinghua University, Beijing, China*

12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS

12-10-1 Modeling and Experiments in Nanomechanics and Nanomaterials 1

Third Floor, David L. Lawrence Convention Center, Room 335
9:45am–11:30am

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Jeffrey Kysar, *Columbia University, New York, NY, United States*, Scott Price, *GE Research Center, Niskayuna, NY, United States*, Changhong Ke, *State University of New York at Binghamton, Binghamton, NY, United States*

9:45am – Post-Buckled Deformation of Graphene

Technical Presentation. IMECE2018-88585

Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

10:06am – Material Design for Nanosized FePd Ferromagnetic Shape Memory Alloy Nano-Materials by Thermodynamics and Dislocation Punching Models

Technical Presentation. IMECE2018-89454

Minoru Taya, *University of Washington, Seattle, WA, United States*

10:27am – Probing the Structural and Mechanical Properties of Boron Nitride Nanosheets

Technical Presentation. IMECE2018-87093

Wenyang Qu, **Feilin Gou**, *State University of New York at Binghamton, Binghamton, NY, United States*, **Xiaoming Chen**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, **Changhong Ke**, *State University of New York at Binghamton, Binghamton, NY, United States*

10:48am – Probing Mechanics of Monolayer Two-Dimensional Nanomaterials

Technical Presentation. IMECE2018-86296

Yingchao Yang, *University of Maine, Orono, ME, United States*

11:09am – Mechanics of Nanofiber Packing in Vesicles: Effects of Fiber Length, Radius, and Elasticity

Technical Presentation. IMECE2018-88975

Xin Yi, *Peking University, Beijing, China*, Guijin Zou, *Huajian Gao, Brown University, Providence, RI, United States*

12-15 INAUGURAL SYMPOSIUM ON THE CONSTITUTIVE MODELING OF THE MECHANICAL BEHAVIOR AND PERFORMANCE OF ELECTRONIC, PHOTONIC, MEMS, AND NEMS MATERIALS, ASSEMBLIES, PACKAGES, MODULES, AND SYSTEMS

12-15-1 Inaugural Symposium on the Constitutive Modeling of the Mechanical Behavior and Performance of Electronic, Photonic, MEMS, and NEMS Materials, Assemblies, Packages, Modules, and Systems

Third Floor, David L. Lawrence Convention Center, Room 331
9:45am–11:30am

Session Chair: Martin Ostoja-Starzewski, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

9:45am – Equivalent Material Properties for Thermo-Mechanical Modeling of Microelectronic Packages

Technical Presentation. IMECE2018-86238

Yu-Lin Shen, *University of New Mexico, Albuquerque, NM, United States*

10:00am – Does a Fractal Microstructure Require a Fractional Viscoelastic Model?

Technical Presentation. IMECE2018-88369

Martin Ostoja-Starzewski, Jun Zhang, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10:15am – Anisotropic Hill Constants for Steady-State Creep Behavior of Single Crystal SnAgCu Joints Based on Multi-scale Modeling

Technical Presentation. IMECE2018-88791

Qian Jiang, Abhijit Dasgupta, *University of Maryland, College Park, MD, United States*

10:30am – Constitutive Model for Pressure-Sensitive Adhesive (PSA) Joints

Technical Presentation. IMECE2018-88796

Hao Huang, Abhijit Dasgupta, *University of Maryland, College Park, MD, United States*

10:45am – Alleviating Thermomechanical Wrinkling in Functionally Graded Sandwich Panels Using Nanoscale Reinforcement of the Core Material

Technical Presentation. IMECE2018-88817

Victor Birman, *Missouri University of Science and Technology, St. Louis, MO, United States*

11:00am – An Overview of Thermomechanical Fatigue in Cu Interconnects: Probabilistic and Statistical Considerations for Robust Design and Qualification

Technical Presentation. IMECE2018-88843

John Evans, *NASA, Washington, DC, United States*, Bhanu Sood, *NASA, Greenbelt, MD, United States*, Michael Osterman, *University of Maryland, College Park, MD, United States*

12-18 COMPUTATIONAL MODELING OF EXTREME EVENTS

12-18-1 Computational Modeling of Extreme Events
Third Floor, David L. Lawrence Convention Center, Room 336
9:45am–11:30am

Session Chair: Jason Roth, *U.S. Army - ERDC, Vicksburg, MS, United States*

9:45am – Data-Driven, Co-Designed Simulations and Experiments of Shock Synthesis

Invited Presentation. IMECE2018-88032

Karel Matouš, *University of Notre Dame, Notre Dame, IN, United States*

10:27am – Modeling and Simulations on Coupled Plastic Flows and Plastic Strain-Induced Phase Transformations in Diamond Anvil Cells

Technical Presentation. IMECE2018-89055

Biao Feng, *Los Alamos National Laboratory, Los Alamos, NM, United States*, Valery Levitas, *Iowa State University, Ames, IA, United States*

10:48am – Dynamic Fragmentation of Brittle Materials Using Eulerian Methods

Technical Presentation. IMECE2018-89448

Vinamra Agrawal, *Auburn University, Auburn, AL, United States*

11:09am – A Comparison of Mesh-Free and Mesh-Based Lagrangian Approximations of Manufactured Shear-Dominated Deformation Fields

Technical Presentation. IMECE2018-89219

Joseph Bishop, *Sandia National Laboratories, Albuquerque, NM, United States*

12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION

12-19-1 Computational Fluid-Structure Interaction

Third Floor, David L. Lawrence Convention Center, Room 338
9:45am–11:30am

Session Chair: Artem Korobenko, *University of Calgary, Calgary, AB, Canada*

9:45am – Fluid-Structure Interaction Between Pulsatile Blood Flow and a Curved Stented Coronary Artery on a Beating Heart: A Four Stent Computational Study

Technical Presentation. IMECE2018-88827

Suncica Canic, *University of California, Berkeley, Berkeley, Houston, TX, United States*, **Martina Bukac**, *University of Notre Dame, South Bend, IN, United States*, **Josip Tambaca**, *University of Zagreb, Zagreb, Croatia (Hrvatska)*, **Yifan Wang**, *University of California, Berkeley, Berkeley, CA, United States*

10:06am – Fluid-Structure Interaction Modeling of Transcatheter Heart Valve Replacements

Technical Presentation. IMECE2018-90003

Ming-Chen Hsu, **Michael C.H. Wu**, *Iowa State University, Ames, IA, United States*

10:27am – Fluid-Structure Interaction in Abdominal Aortic Aneurysm

Technical Presentation. IMECE2018-89030

Siyeong Ju, **Linxia Gu**, **Shengmao Lin**, *University of Nebraska–Lincoln, Lincoln, NE, United States*, **Xinwei Han**, **Yonghua Bi**, *Zhengzhou University, Zhengzhou, China*

10:48am – An Open-source Framework for FSI of Bio-Inspired Flows at High Reynolds Number

Technical Presentation. IMECE2018-89308

Andrew Guarendi, **Christin Murphy**, *Naval Undersea Warfare Center, Newport, RI, United States*, **Jennifer Franck**, *University of Wisconsin-Madison, Madison, WI, United States*

11:09am – Optimum Pitching-Heaving of a Foil for Extracting Power From an Incident Freestream

Technical Presentation. IMECE2018-89680

Shreyas Mandre, **Kenny Breuer**, *Brown University, Providence, RI, United States*, **Michael Miller**, *Brown University, Pawtucket, RI, United States*

12-22 DEFORMATION AND FAILURE OF MULTIFUNCTIONAL MATERIALS

12-22-1 Deformation and Failure of Multifunctional Materials

Fourth Floor, David L. Lawrence Convention Center, Room 401
9:45am–11:30am

Session Chair: Charles Wojnar, *Missouri S&T, Rolla, MO, United States*

9:45am – Study of the Effect of Large Deformation Through a Finite Deformation Based Constitutive Model for Metallic Glasses

Technical Paper Publication. IMECE2018-86063

Shank S. Kulkarni, *University of North Carolina at Charlotte, Charlotte, NC, United States*, **Tanmay K. Bhandakkar**, *Indian Institute of Technology Bombay, Mumbai, India*

10:06am – A Finite Strain Constitutive Model for Polycrystalline Shape Memory Alloys Accounting for Pseudoelasticity, One Way Shape Memory Effect, Orientation, Reorientation, Ferroelasticity, and Latent Heat

Technical Presentation. IMECE2018-88820

Theocharis Baxevanis, **Mengqian Zhang**, *University of Houston, Houston, TX, United States*

10:27am – Asymptotic Analysis of Sponge Spicules' Sensitivity to Geometric Imperfection Regarding to Buckling Instability

Technical Presentation. IMECE2018-89173

Wenqiang Fang, **Michael Monn**, **Haneesh Kesari**, *Brown University, Providence, RI, United States*

10:48am – On Buckling Analysis for Biomedical Shape Memory Alloy Stent Graft Under Axial, Lateral and Combined Loadings

Technical Presentation. IMECE2018-89457

Lei Xu, **Hector Larin**, **Dimitris Lagoudas**, *Texas A&M University, College Station, TX, United States*

12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

12-28-1 Instabilities in Solids and Structures: Mechanics of Slender Solids

Third Floor, David L. Lawrence Convention Center, Room 334
9:45am–11:30am

Session Chair: Stavros Gaitanaros, *Johns Hopkins University, Baltimore, MD, United States*

Session Co-Chair: Pedro Reis, *École Polytechnique Fédérale de Lausanne, Lausanne, VD, Switzerland*

9:45am – Untangling the Mechanics of Elastic Knots

Technical Presentation. IMECE2018-89092

Pedro Reis, **Paul Johanns**, **Paul Grandgeorge**, *École Polytechnique Fédérale de Lausanne, Lausanne, VD, Switzerland*

10:06am – Bistable Inflatable Origami-Inspired Structures

Technical Presentation. IMECE2018-89330

Katia Bertoldi, David Melancon, Chuck Hoberman, *Harvard University, Cambridge, MA, United States*, **Jason Ku, Erik Demaine**, *Massachusetts Institute of Technology, Cambridge, MA, United States*

10:27am – Exploiting Structural Buckling: A Novel Manufacturing Approach to Three-Dimensional Functional Mesostructures

Technical Presentation. IMECE2018-89859

Xin Ning, *Pennsylvania State University, Urbana, IL, United States*, **John Rogers**, *Northwestern University, Evanston, IL, United States*

10:48am – Tunable Bistability of Clamped Elastic Beams

Technical Presentation. IMECE2018-89925

Yin Liu, Zhe Xu, Lin Dong, Xiaomin Han, John X.J. Zhang, Zi Chen, *Dartmouth College, Hanover, NH, United States*

11:09am – Mechanically-Guided Assembly of Complex 3D Mesostructures by Compressive Buckling: Kirigami-Inspired 3D Membranes and Strain Engineering of Elastomer Substrates

Technical Presentation. IMECE2018-89161

Haiwen Luan, *Northwestern University, Evanston, IL, United States*, **Yihui Zhang**, *Tsinghua University, Beijing, China*, **Yonggang Huang**, *Northwestern University, Evanston, IL, United States*

12-1 MECHANICS OF SOFT MATERIALS

12-1-2 Mechanics of Soft Materials: Gels/Active Materials 1

Third Floor, David L. Lawrence Convention Center, Room 333
1:45pm–3:30pm

Session Chair: Shawn Chester, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

1:45pm – Micro-Mechanical Modeling of the Stress Softening in Double-Network Hydrogels

Technical Paper Publication. IMECE2018-88252

Vahid Morovati, Roozbeh Dargazany, *Michigan State University, East Lansing, MI, United States*

2:00pm – Poroelastic Effects on Fracture of Gels

Technical Presentation. IMECE2018-88961

Yalin Yu, Chad Landis, Rui Huang, *University of Texas at Austin, Austin, TX, United States*

2:15pm – Anti-Fatigue-Fracture Hydrogels by Designing Crystalline Domains

Technical Presentation. IMECE2018-89088

Shaoting Lin, Xuanhe Zhao, *Massachusetts Institute of Technology, Cambridge, MA, United States*

2:30pm – Modeling Fiber-reinforced Polymeric Gels

Technical Presentation. IMECE2018-89417

Nikola Bosnjak, *New Jersey Institute of Technology, Newark, NJ, United States*, **Howon Lee**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Shawn Chester**, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

2:45pm – A WENO Finite-Difference Scheme for a New Class of Hamilton-Jacobi Equations in Nonlinear Solid Mechanics

Technical Presentation. IMECE2018-89236

Victor Lefevre, *Northwestern University, Evanston, IL, United States*, **Oscar Lopez-Pamies**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

3:00pm – Liquid Metal Elastomer Composites for Low Temperature Applications

Technical Presentation. IMECE2018-89665

Mohammad H. Malakooti, Navid Kazem, Carmel Majidi, *Carnegie Mellon University, Pittsburgh, PA, United States*

12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS

12-10-2 Modeling and Experiments in Nanomechanics and Nanomaterials 2

Third Floor, David L. Lawrence Convention Center, Room 335
1:45pm–3:30pm

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Jeffrey Kysar, *Columbia University, New York, NY, United States*, Yingchao Yang, *University of Maine, Orono, ME, United States*

1:45pm – Nano-Emitter Mass-Loss Mechanisms and Predicted Damage Patterns

Technical Presentation. IMECE2018-88076

Scott Price, *G E Research Center, Niskayuna, NY, United States*, **Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

2:06pm – Direct Nanomechanical Measurements of Carbon Nanotube-Metal Interfaces

Technical Presentation. IMECE2018-87078

Chenglin Yi, Christopher M. Dmuchowski, Feilin Gou, *State University of New York at Binghamton, Binghamton, NY, United States*, **Xiaoming Chen**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, **Cheol Park**, *NASA Langley Research Center, Hampton, VA, United States*, **Changhong Ke**, *State University of New York at Binghamton, Binghamton, NY, United States*

2:27pm – Structural and Mechanical Properties of Boron Nitride Nanotubes in High Temperature Environments

Technical Presentation. IMECE2018-87074

Xiaoming Chen, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, **Christopher M. Dmuchowski**, *State University of New York at Binghamton, Binghamton, NY, United States*, **Cheol Park, Catharine C. Fay**, *NASA Langley Research Center, Hampton, VA, United States*, **Changhong Ke**, *State University*

2:48pm – Mechanical and Electrical Properties of Graphene Nano Mesh Heterojunctions**Technical Presentation. IMECE2018-87021**

Ji Zhang, Weixiang Zhang, *University at Buffalo, State University of New York, Buffalo, NY, United States*,
Tarek Ragab, *Arkansas State University, State University, AR, United States*, **Cemal Basaran**, *University at Buffalo, State University of New York, Buffalo, NY, United States*

3:09pm – Electron-Induced Wind Forces in Metallic Graphene Nanoribbons**Technical Presentation. IMECE2018-87022**

Ji Zhang, *University at Buffalo, State University of New York, Buffalo, NY, United States*, **Tarek Ragab**, *Arkansas State University, State University, AR, United States*, **Cemal Basaran**, *University at Buffalo, State University of New York, Buffalo, NY, United States*

12-18 COMPUTATIONAL MODELING OF EXTREME EVENTS**12-18-2 Computational Modeling of Extreme Events**

Third Floor, David L. Lawrence Convention Center, Room 336
1:45pm–3:30pm

Session Chair: Jason Roth, *U.S. Army - ERDC, Vicksburg, MS, United States*

1:45pm – Constitutive Models and Their Application to Predict Geomaterial Failure Resulting From Embedded Detonations**Invited Presentation. IMECE2018-86714**

Andy Frank, Jessica Fulk, Jason Roth, Mike Hammons, *U.S. Army - ERDC, Vicksburg, MS, United States*

2:27pm – Dislocation Mobility and Non-Schmid Effects in HMX Under High Pressures**Technical Presentation. IMECE2018-89294**

Anirban Pal, Mohammad Khan, Catalin Picu, *Rensselaer Polytechnic Institute, Troy, NY, United States*

2:48pm – Modeling Plastic Slip, Twinning, and Phase Transformation in Single Crystal Titanium Under Dynamic Loading Conditions**Technical Presentation. IMECE2018-89056**

Biao Feng, Curt Bronkhorst, *Los Alamos National Laboratory, Los Alamos, NM, United States*

3:09pm – Simulation of Delayed Hydride Cracking Behavior in Zircaloy Cladding Tubes Considering Irradiation Damage Effects**Technical Presentation. IMECE2018-89541**

Shurong Ding, Zhongjia Xia, Jingyu Zhang, *Fudan University, Shanghai, China*

12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION**12-19-2 Computational Fluid-Structure Interaction**

Third Floor, David L. Lawrence Convention Center, Room 338
1:45pm–3:30pm

Session Chair: Artem Korobenko, *University of Calgary, Calgary, AB, Canada*

1:45pm – A Dual-Solver Hybrid Approach for Fluid-Structure Interaction of Rotating Systems**Technical Presentation. IMECE2018-89309**

Marilyn Smith, *Georgia Institute of Technology, Atlanta, GA, United States*, **Glen Whitehouse**, *Continuum Dynamics Inc., Ewing, NJ, United States*

2:06pm – Computational Aeroelasticity for Systems With Flexible Wings**Technical Presentation. IMECE2018-88847**

Balakumar Balachandran, *University of Maryland, College Park, Rockville, MD, United States*

2:27pm – Constructal Approach in Design of High Aspect-Ratio Aircraft: The Concept of Flow of Stresses and Aeroelastic Stability**Technical Presentation. IMECE2018-87824**

Pezhman Mardanpour, *Florida International University, Weston, FL, United States*, **Ehsan Izadpanahi, Siavash Rastkar**, *Florida International University, Miami, FL, United States*, **Sylvie Lorente**, *University of Toulouse, INSA, Toulouse, France*, **Adrian Bejan**, *Duke University, Durham, NC, United States*

2:48pm – Fluid-Structure Interaction Framework for Compressible Flows**Technical Presentation. IMECE2018-90045**

Artem Korobenko, *University of Calgary, Calgary, AB, Canada*, **Yuri Bazilevs**, *Brown University, Providence, RI, United States*, **Ming-Chen Hsu**, *Iowa State University, Ames, IA, United States*, **David Kamensky, Georgios Moutsanidis**, *Brown University, Providence, RI, United States*

12-28 INSTABILITIES IN SOLIDS AND STRUCTURES**12-28-2 Instabilities in Solids and Structures: Numerical/Analytical Stability**

Third Floor, David L. Lawrence Convention Center, Room 334
1:45pm–3:30pm

Session Chair: Xin Ning, *Pennsylvania State University, Urbana, IL, United States*

Session Co-Chair: Nicolas Triantafyllidis, *Ecole Polytechnique, Palaiseau, France*

1:45pm – Hierarchical Honeycomb Material Design and Optimization: Beyond Linearized Behavior**Technical Presentation. IMECE2018-89386**

Christelle Combescure, *Université Paris-Est Mar Champs-sur-Marne, France*, **Ryan Elliott**, *University of*

2:06pm – Numerical Energy Relaxation and Associated Microstructure Formation in Problems With Non-Convex Energetic Potentials

Technical Presentation. IMECE2018-89532

Siddhant Kumar, Vidyasagar Ananthan, *California Institute of Technology, Pasadena, CA, United States*, Dennis Kochmann, *ETH Zurich, Zurich, Switzerland*

2:27pm – Fracture and Healing in Elastomers: A Phase-Transition Theory and Numerical Implementation

Technical Presentation. IMECE2018-89171

Aditya Kumar, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Krishnaswamy Ravi-Chandar, *University of Texas at Austin, Austin, TX, United States*, Gilles A. Francfort, *Courant Institute of Mathematical Sciences, New York, NY, United States*, Oscar Lopez-Pamies, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

2:48pm – Post-Buckling Analysis of Wide Beams

Technical Presentation. IMECE2018-89367

Yuzhen Chen, Lihua Jin, *University of California, Los Angeles, Los Angeles, CA, United States*

3:09pm – Stability Analysis of Step Dynamics in Crystal Growth

Technical Presentation. IMECE2018-89128

Laurent Guin, Michel Jabbour, Nicolas Triantafyllidis, *Ecole Polytechnique, Palaiseau, France*

12-33 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM—NONDESTRUCTIVE CHARACTERIZATION OF SOLIDS, STRUCTURES AND FLUIDS

12-33-1 Congress-Wide Symposium on NDE & SHM—Nondestructive Characterization of Solids, Structures and Fluids

Third Floor, David L. Lawrence Convention Center, Room 331
1:45pm–3:30pm

Session Chair: Soumik Banerjee, *Washington State University, Pullman, WA, United States*

1:45pm – Integrity Evaluation of Composite Cylindrical Structures

Technical Paper Publication. IMECE2018-87158

Jikai Du, *University at Buffalo, State University of New York, Buffalo, NY, United States*

2:06pm – Locating and Quantifying Through Circular Damage in CNT/GFRP Composite Panel Using Gaussian Fit
Technical Paper Publication. IMECE2018-87681

Kerim Ikkardaslar, *CCNY/CUNY, New York, NY, United States*, Feridun Delale, *City College of New York, New York, NY, United States*, Mahmoud Ardebili, *Borough of Manhattan Community College/CUNY, New York, NY, United States*, Salih Yildiz, Kenneth Gollins, *City College of New York, New York, NY, United States*

2:27pm – Analysis Alkali-Silica Reaction in Concrete With Electromagnetic Methods

Technical Presentation. IMECE2018-88034

Alexander Heifetz, *Argonne National Laboratory, Lemont, IL, United States*, Anthony Bentivegna, *CTLGroup, Skokie, IL, United States*, Sasan Bakhtiari, *Argonne National Laboratory, Lemont, IL, United States*

2:48pm – Entropy as an Indicator of Stress-Relaxation in Composites

Technical Presentation. IMECE2018-89100

Subir Patra, Sourav Banerjee, *University of South Carolina, Columbia, SC, United States*

3:09pm – Prediction of Leak Rates Through Porous Materials Using Analytical and Numerical Approaches

Technical Paper Publication. IMECE2018-88683

Ali Salah Omar Aweimer, Abdel-Hakim Bouzid, *École Technologie Supérieure, Montreal, QC, Canada*, Zijian Zhao, *Skyeetech Ltd., Shenyang, China*

12-36 KEYNOTE LECTURES ON COMPUTATIONAL MECHANICS

12-36-1 Keynote Lectures on Computational Mechanics – 1

Fourth Floor, David L. Lawrence Convention Center, Room 402
1:45pm–3:30pm

Session Chair: Qian Qian, *University of Texas at Dallas, Richardson, TX, United States*

Session Co-Chair: Caglar Oskay, *Vanderbilt University, Nashville, TN, United States*

1:45pm – Coupled Shock-Plasticity-Damage Modeling of Explosive Welding by RKPM

Invited Presentation. IMECE2018-88929

Jiun-Shyan Chen, Jonghyuk Baek, *University of California, San Diego, La Jolla, CA, United States*

2:27pm – Computational Design of Phononic Topological Insulators

Invited Presentation. IMECE2018-89015

Harold Park, *Boston University, Brookline, MA, United States*, Nanthakumar Subbiah, Xiaoying Zhuang, *Leibniz University Hannover, Hannover, Germany*, Timon Rabczuk, *Bauhaus-University Weimar, Weimar, Germany*

3:09pm – Emerging Trends in Computational Mechanics—Data-Driven Computation and Mechanics

Technical Presentation. IMECE2018-88908

Ashfaq Adnan, *University of Texas at Arlington, Arlington, TX, United States*

12-38 YOUNG MEDALIST SYMPOSIUM

12-38-1 Young Medalist Symposium

Fourth Floor, David L. Lawrence Convention Center, Room 401
1:45pm–3:30pm

Session Chair: Yihui Zhang, *Tsinghua University, Beijing, China*

1:45pm – Propagating Transition Fronts in (Meta-)Materials: From Simple Chains to 2D Patterns

Technical Presentation. IMECE2018-89052

Dennis Kochmann, Romik Khajehtourian, *ETH Zurich, Zurich, Switzerland*, Michael Frazier, *University of California, San Diego, La Jolla, CA, United States*, Katia Bertoldi, *Harvard University, Cambridge, MA, United States*

2:06pm – Evolution of Stress and Structure During Electrochemical Cycling of Sulfur Cathodes

Technical Presentation. IMECE2018-89256

Matt Pharr, *Texas A&M University, College Station, TX, United States*

2:27pm – Energy Localization in Nonlinear Dynamical Systems: Design, Measurement, and Control

Technical Presentation. IMECE2018-88949

Edmon Perkins, *Auburn University, Auburn, AL, United States*

2:48pm – Coarse-Graining Out of Equilibrium: From Particles to Dissipative PDEs

Technical Presentation. IMECE2018-88948

Celia Reina, Xiaoguai Li, *University of Pennsylvania, Philadelphia, PA, United States*, Nicolas Dirr, Peter Embacher, *University of Cardiff, Cardiff, United Kingdom*, Johannes Zimmer, *University of Bath, Bath, United Kingdom*

12-1 MECHANICS OF SOFT MATERIALS

12-1-3 Mechanics of Soft Materials: Gels/Active Materials 2

Third Floor, David L. Lawrence Convention Center, Room 333
3:45pm–5:30pm

Session Chair: Shawn Chester, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

3:45pm – Phase Separation in Elastomeric Gels

Technical Presentation. IMECE2018-88670

Wei Hong, *Iowa State University, Ames, IA, United States*

4:06pm – New Insights on the Viscoelastic Behavior of Polymeric Gels

Technical Presentation. IMECE2018-89413

Nikola Bosnjak, Justin Newkirk, *New Jersey Institute of Technology, Newark, NJ, United States*, Shawn Chester, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

4:27pm – Swelling, Drying and Viscoelasticity of Hydrogels

Technical Presentation. IMECE2018-89286

Si Chen, Krishnaswamy Ravi-Chandar, *University of Texas at Austin, Austin, TX, United States*

4:48pm – Comparison Between Temperature-Dependent Mechanical Properties of Thermo-Responsive Poly (Vinyl Alcohol) Poly (N-Isopropyl Acrylamide) Hydrogel and Non-Thermo-Responsive Alginate Hydrogel

Technical Presentation. IMECE2018-87790

Yuqi Jin, Shuai Ju, Hyeonu Heo, *University of North Texas, Denton, TX, United States*, Ezekiel Walker, *Echonovus Inc., Denton, TX, United States*, Haifeng Zhang, Tae-Youl Choi, Arup Neogi, *University of North Texas, Denton, TX, United States*

5:09pm – A New Scaling Law for Describing How Water Content Affects Elastic Modulus and Fracture Energy of Hydrogels

Technical Presentation. IMECE2018-89158

Zishun Liu, Ziqian Li, *Xi'an Jiaotong University, Xi'an, China*

12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS

12-10-3 Modeling and Experiments in Nanomechanics and Nanomaterials 3

Third Floor, David L. Lawrence Convention Center, Room 335
3:45pm–5:30pm

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Jeffrey Kysar, *Columbia University, New York, NY, United States*, George Voyiadjis, *Louisiana State University, Baton Rouge, LA, United States*, Tarek Ragab, *Arkansas State University, State University, AR, United States*

3:45pm – Modeling of Indentation Size Effect in Amorphous Polymers

Technical Presentation. IMECE2018-87076

George Voyiadjis, Leila Malekmtiei, Aref Samadi-Dooki, *Louisiana State University, Baton Rouge, LA, United States*

4:06pm – Frictional Properties of Graphene Nano Flakes on Diamond Substrate

Technical Presentation. IMECE2018-89268

Ji Zhang, Ehsan Osloub, Fatima Siddiqui, Weixiang Zhang, *University at Buffalo, State University of New York, Buffalo, NY, United States*, Tarek Ragab, *Arkansas State University, State University, AR, United States*, Cemal Basaran, *University at Buffalo, State University of New York, Buffalo, NY, United States*

4:27pm – Tuning the Contact Angle and Evaporation Rate of Water Droplets on Laser Processed Graphene Flakes

Technical Presentation. IMECE2018-89949

Srilok Srinivasan, *Iowa State University, Ames, IA, United States*, Ganesh Balasubramanian, *Lehigh University, Bethlehem, PA, United States*, Suprem Das, *Kansas State University, Manhattan, KS, United States*

4:48pm – Mechanistic Insights Into Crystalline Interfaces via Thermal Fluctuations

Technical Presentation. IMECE2018-89997

Dengke Chen, *Georgia Institute of Technology, Atlanta, GA, United States*, **Yashashree Kulkarni**, *University of Houston, Houston, TX, United States*

5:09pm – OpenKIM: Reliable Interatomic Models for Multiscale Simulations

Technical Presentation. IMECE2018-89384

Ryan Elliott, *University of Minnesota, Saint Paul, MN, United States*, **Ellad Tadmor**, **Daniel Karls**, *University of Minnesota, Minneapolis, MN, United States*, **James Sethna**, *Cornell University, Ithaca, NY, United States*

12-13 RECENT ADVANCES AND APPLICATIONS IN MESHFREE AND PARTICLE METHODS

12-13-1 Recent Advances and Applications in Meshfree and Particle Methods

Third Floor, David L. Lawrence Convention Center, Room 336
3:45pm–5:30pm

Session Chair: Sheng-Wei Chi, *University of Illinois at Chicago, Chicago, IL, United States*

Session Co-Chair: Pablo Seleson, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

3:45pm – Methods and Challenges of Material Failure Modeling and Multiscale Computation in Industrial Applications

Technical Presentation. IMECE2018-88772

C.T. Wu, **Wei Hu**, **Bo Ren**, **Youcai Wu**, **Yong Guo**, **Xiaofei Pan**, **Zeliang Liu**, *Livermore Software Technology Corporation, Livermore, CA, United States*

4:20pm – Generalized Reproducing Kernel Peridynamics

Technical Presentation. IMECE2018-89871

Michael Hillman, *Pennsylvania State University, University Park, PA, United States*

4:35pm – Convergence Studies in Meshfree Peridynamic Simulations

Technical Presentation. IMECE2018-89982

Pablo Seleson, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **David Littlewood**, *Sandia National Laboratories, Albuquerque, NM, United States*

4:50pm – On the Stability of the Generalized, Ordinary, Finite Deformation Constitutive Correspondence Model of Peridynamics

Technical Presentation. IMECE2018-89917

Masoud Behzadinasab, **John Foster**, *University of Texas at Austin, Austin, TX, United States*

5:05pm – Consistent Strong Enforcement of Essential Boundary Conditions in Meshfree Methods

Technical Presentation. IMECE2018-89937

Kuan-Chung Lin, *Pennsylvania State University, State College, PA, United States*, **Michael Hillman**, *Pennsylvania State University, University Park, PA, United States*

12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION

12-19-3 Computational Fluid-Structure Interaction

Third Floor, David L. Lawrence Convention Center, Room 338
3:45pm–5:30pm

Session Chair: Artem Korobenko, *University of Calgary, Calgary, AB, Canada*

3:45pm – A Corrected Point-Particle Method for Simulation of Particle-Laden Flows

Technical Presentation. IMECE2018-88559

Mahdi Esmaily, *Cornell University, Ithaca, NY, United States*, **Jeremy A. Horwitz**, *Stanford University, Stanford, CA, United States*

4:06pm – An Adaptive Robin Transmission Condition for Fluid-Structure Coupled Simulations

Technical Presentation. IMECE2018-89280

Shunxiang Cao, *Virginia Tech, Blacksburg, VA, United States*, **Alex Main**, *Duke University, Durham, NC, United States*, **Kevin G. Wang**, *Virginia Tech, Blacksburg, VA, United States*

4:27pm – Partitioned Coupling Method Between Three-Dimensional Heat Conduction Analysis and One-Dimensional Analysis of Cooling Pipe Model

Technical Presentation. IMECE2018-88979

Naoto Mitsume, **Tomonori Yamada**, **Shinobu Yoshimura**, *University of Tokyo, Tokyo, Japan*

4:48pm – Computational Fluid Structure Interaction Simulation and Validation of Crossflow Through a Tube Bundle

Technical Presentation. IMECE2018-89759

Landon Brockmeyer, *Texas A&M University, College Station, TX, United States*, **Elia Merzari**, *Argonne National Laboratory, Lemont, IL, United States*, **Jerome Solberg**, *LLNL, Livermore, CA, United States*, **Yassin Hassan**, *Texas A&M University, College Station, TX, United States*

5:09pm – Fluid-Structure Interactions Using an Immersed Boundary Method: A Turbulence Generator

Technical Presentation. IMECE2018-89305

Siamak Mirfendereski, **Jae Sung Park**, *University of Nebraska–Lincoln, Lincoln, NE, United States*

12-22 DEFORMATION AND FAILURE OF MULTIFUNCTIONAL MATERIALS

12-22-2 Deformation and Failure of Multifunctional Materials

Fourth Floor, David L. Lawrence Convention Center, Room 405
3:45pm–5:30pm

Session Chair: Russell Mailen, *Auburn University, Auburn, AL, United States*

3:45pm – Mechanics of Fracture in Lithium-Ion Storage Materials

Technical Presentation. IMECE2018-89837

Xueju Wang, *University of Missouri, Columbia, Columbia, MO, United States*, **Min Zhou, Shuman Xia**, *Georgia Institute of Technology, Atlanta, GA, United States*

4:06pm – Design and Characteristic Analysis of Amalgamated Transparent Materials for Armor Structures Using Defeating Ballistic Experimentation

Technical Paper Publication. IMECE2018-86122

Emad Attalla, *Lawrence Technological University, Southfield, MI, United States*, **Steven Grate**, *AM General LLC, Auburn Hills, MI, United States*, **Badih Jawad**, *Lawrence Technological University, Dearborn Heights, MI, United States*, **Vernon Fernandez, Sabah Abro, Liping Liu**, *Lawrence Technological University, Southfield, MI, United States*

4:27pm – Experimental Determination of Crack Growth Rates During Actuation of NiTi and NiTiHf Shape Memory Alloys

Technical Presentation. IMECE2018-89010

Ceylan Hayrettin, Benjamin Young, *Texas A&M University, College Station, TX, United States*, **Theocharis Baxevanis**, *University of Houston, Houston, TX, United States*, **Ibrahim Karaman, Dimitris Lagoudas**, *Texas A&M University, College Station, TX, United States*

4:48pm – Failure Mechanism of Cementitious Nanocomposites Reinforced by Multi-Walled and Single-Walled Carbon Nanotubes Under Splitting Tensile Test

Technical Paper Publication. IMECE2018-88512

Robabeh Jazaei, Moses Karakouzian, Brendan O'Toole, Jaeyun Moon, Samad Gharehdaghi, *University of Nevada, Las Vegas, Las Vegas, NV, United States*

12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

12-28-3 Instabilities in Solids and Structures: Active and Soft Materials

Third Floor, David L. Lawrence Convention Center, Room 334
3:45pm–5:30pm

Session Chair: Stelios Kyriakides, *University of Texas at Austin, Austin, TX, United States*

Session Co-Chair: Dai Okumura, *Nagoya University, Nagoya, Japan*

3:45pm – Swelling-Induced Strain Softening of Swollen Elastomers

Technical Presentation. IMECE2018-89159

Dai Okumura, *Nagoya University, Nagoya, Japan*

4:06pm – Nonlinear Electroelastic Deformations of Soft Layered Composites Containing Space Charges, With Application to Electrets

Technical Presentation. IMECE2018-89237

Victor Lefevre, *Northwestern University, Evanston, IL, United States*, **Oscar Lopez-Pamies**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

4:27pm – Bifurcation Analysis of Twisted Liquid Crystal Bilayers

Technical Presentation. IMECE2018-89046

Dipayan Mukherjee, *Ecole Polytechnique, CNRS, Palaiseau, Ile-de-France, France*, **Kostas Danas**, *LMS, CNRS, Ecole Polytechnique, Palaiseau, Ile-de-France, France*, **Nicolas Triantafyllidis**, *Ecole Polytechnique, Palaiseau, France*

4:48pm – Rayleigh-Taylor Instability in a Confined Elastic Soft Cylinder

Technical Presentation. IMECE2018-89162

Yue Zheng, Shengqiang Cai, *University of California San Diego, La Jolla, CA, United States*

5:09pm – Freestanding 3D Mesostructures and Functional Devices Based on Mechanically Induced Assembly of Shape Memory Polymers

Technical Presentation. IMECE2018-89948

Xueju Wang, *University of Missouri, Columbia, Columbia, MO, United States*, **Xiaogang Guo**, *Tsinghua University, Beijing, China*, **Yonggang Huang**, *Northwestern University, Evanston, IL, United States*, **Yihui Zhang**, *Tsinghua University, Beijing, China*, **John Rogers**, *Northwestern University, Evanston, IL, United States*

12-35 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM—ACTIVE AND PASSIVE HEALTH MONITORING OF STRUCTURES

12-35-1 Congress-Wide Symposium on NDE & SHM—Active and Passive Health Monitoring of Structures

Third Floor, David L. Lawrence Convention Center, Room 331
3:45pm–5:30pm

Session Chair: Sridhar Santhanam, Villanova University, Collegeville, PA, United States

3:45pm – Acoustic Emission Low-Temperature Performance Grade Evaluation of Asphalt Roadways Materials

Technical Paper Publication. IMECE2018-86067
Lihui Sun, University of Illinois at Urbana-Champaign, Urbana, IL, United States, **Behzad Behnia**, Clarkson University, New York, NY, United States, **William Buttlar**, University of Missouri, Columbia, Columbia, MO, United States, **Henrique Reis**, University of Illinois at Urbana-Champaign, Urbana, IL, United States

4:06pm – Amplitude and Sweeping Direction Dependent Nonlinear Ultrasonic Resonance Spectroscopy for Fatigue Crack Detection

Technical Paper Publication. IMECE2018-86221
Yanfeng Shen, **Nipon Roy**, **Junzhen Wang**, **Zixuan Liu**, **Danyu Rao**, **Wu Xu**, Shanghai Jiao Tong University, Shanghai, China

4:27pm – Improved Nonlinear Ultrasonic Guided Wave Damage Detection Using a Bandgap Meta-Surface

Technical Paper Publication. IMECE2018-86222
Yiran Tian, **Yanfeng Shen**, Shanghai Jiao Tong University, Shanghai, China

4:48pm – Coupling Behaviors in Remotely Bonded Fiber Bragg Grating Sensors for Lamb Wave Detection

Technical Presentation. IMECE2018-87972
Junghyun Wee, **Drew Hackney**, **Kara Peters**, North Carolina State University, Raleigh, NC, United States

5:09pm – Acoustoelastic Dispersion Curves for Lamb Waves in the Presence of Stress Gradients

Technical Presentation. IMECE2018-89278
Kranthi Prakash Peddetti, FLSmidth Inc./Villanova University, Bethlehem, PA, United States, **Sridhar Santhanam**, Villanova University, Collegeville, PA, United States

12-36 KEYNOTE LECTURES ON COMPUTATIONAL MECHANICS

12-36-2 Keynote Lectures on Computational Mechanics – 2

Fourth Floor, David L. Lawrence Convention Center, Room 402
3:45pm–5:30pm

Session Chair: Ashfaq Adnan, University of Texas at Arlington, Arlington, TX, United States

Session Co-Chair: Caglar Oskay, Vanderbilt University, Nashville, TN, United States

3:45pm – Efficient Iterative Solvers for Multiscale and Multiphysics Problems

Invited Presentation. IMECE2018-88805
Suvranu De, Rensselaer Polytechnic Institute, Troy, NY, United States

4:27pm – Dynamic Fracture of Metals: A Unified Modeling Approach

Invited Presentation. IMECE2018-88904
Haim Waisman, Columbia University, New York, NY, United States

5:09pm – Advances in Multiscale and Multiphysics Methods

Technical Presentation. IMECE2018-88907
Qian Qian, University of Texas at Dallas, Richardson, TX, United States

12-38 YOUNG MEDALIST SYMPOSIUM

12-38-2 Young Medalist Symposium

Fourth Floor, David L. Lawrence Convention Center, Room 401
3:45pm–5:30pm

Session Chair: Dennis Kochmann, ETH Zurich, Zurich, Switzerland

3:45pm – Morphable 3D Mesostructures and Microelectronic Devices by Multistable Buckling Mechanics

Technical Presentation. IMECE2018-89279
Yihui Zhang, Tsinghua University, Beijing, China

4:06pm – Structural and Microstructural Influence on Deformation and Fracture of Dual-Phase Steels

Technical Presentation. IMECE2018-89288
Xinzhu Zheng, Texas A&M University, College Station, TX, United States, **Shmuel Osovski**, Technion – Israeli Institute of Technology, Haifa, Israel, **Ankit Srivastava**, Texas A&M University, College Station, TX, United States

4:27pm – Combining High-Stiffness and High-Damping in Ceramics via the Domain Switching Mechanism in Ferroelectrics

Technical Presentation. IMECE2018-89771
Charles Wojnar, Missouri S&T, Rolla, MO, United States

TUESDAY, NOVEMBER 13

12-40 PLENARY**12-40-1 Mechanics of Solids, Structures and Fluids Plenary I**

Third Floor, David L. Lawrence Convention Center, Room 308
8:00am–8:45am

8:00am – The Isogeometric Approach to Analysis

Plenary Presentation. IMECE2018-90104

Thomas Hughes, Jr., *University of Texas at Austin, Austin, TX, United States*

12-40 PLENARY**12-40-2 Mechanics of Solids, Structures and Fluids Plenary II**

Third Floor, David L. Lawrence Convention Center, Room 308
9:00am–9:45am

9:00am – How to Design Quasibrittle and Lamellar**Biomimetic Structures for Failure Probability**

Plenary Presentation. IMECE2018-90105

Zdenek Bazant, *Northwestern University, Evanston, IL, United States*

12-1 MECHANICS OF SOFT MATERIALS**12-1-4 Mechanics of Soft Materials: Constitutive Modeling**

Third Floor, David L. Lawrence Convention Center, Room 336
10:00am–11:45am

Session Chair: Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

10:00am – Conjugate Stress/Strain Pair Approach for Anisotropic Materials

Technical Presentation. IMECE2018-87172

Alan Freed, Veysel Erel, Mingliang Jiang, *Texas A&M University, College Station, TX, United States*

10:21am – A Generalized Approach to Improve Approximation of Inverse Langevin Function

Technical Paper Publication. IMECE2018-88228

Vahid Morovati, Roozbeh Dargazany, Hamid Mohammadi, *Michigan State University, East Lansing, MI, United States*

10:42am – An Improved Non-Gaussian Statistical Theory of Rubber Elasticity for Short Chains

Technical Paper Publication. IMECE2018-88234

Vahid Morovati, Roozbeh Dargazany, *Michigan State University, East Lansing, MI, United States*

11:03am – Modeling Tensile-Torsion Response of Double Twisted Helical Yarns

Technical Paper Publication. IMECE2018-88265

Roozbeh Dargazany, *Michigan State University, East Lansing, MI, United States*, Jiaqi Lin, *Massachusetts Institute of Technology, Cambridge, MI, United States*, Hamid Mohammadi, Vahid Morovati, *Michigan State University, East Lansing, MI, United States*

11:24am – Micromechanics to Macroscale Constitutive Modeling of Flexible Foams

Technical Presentation. IMECE2018-89349

Kevin Long, Dan Bolinteanu, Charlotte L.B. Kramer, Robert Waymel, Enrico Quintana, *Sandia National Laboratories, Albuquerque, NM, United States*, Michael Neilsen, *Sandia National Laboratories, Lawrence, KS, United States*

12-8 MULTI-SCALE COMPUTATIONS IN FLUIDS, STRUCTURES, AND MATERIALS**12-8-1 Multi-Scale Computations in Fluids, Structures, and Materials 1**

Fourth Floor, David L. Lawrence Convention Center, Room 401
10:00am–11:45am

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Glaucio Paulino, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Karel Matouš, *University of Notre Dame, Notre Dame, IN, United States*

10:00am – Fatigue Crack Propagation for Semi-Elliptical Cracks

Technical Presentation. IMECE2018-87188

Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

10:21am – Multiresolution Modeling and Error Control With an Adaptive Wavelet Algorithm

Technical Presentation. IMECE2018-88577

Cale Harnish, Karel Matouš, *University of Notre Dame, Notre Dame, IN, United States*, Daniel Livescu, *Los Alamos National Laboratory, Los Alamos, NM, United States*

10:42am – Computational Mechanics of the Size Effects and Shearbands Based on Coupled Thermo-Mechanical Strain Gradient Plasticity Framework

Technical Presentation. IMECE2018-87095

George Voyiadjis, Yooseob Song, *Louisiana State University, Baton Rouge, LA, United States*

11:03am – Simultaneous Spatial and Temporal Coarse-Graining: From Particle Dynamics to Continuum Thermoelasticity

Technical Presentation. IMECE2018-89482

Celia Reina, Xiaoguai Li, *University of Pennsylvania, Philadelphia, PA, United States*

11:24am – Supercoiling of Kirchhoff Rods Under Continuously Distributed Electrostatic Charge and Its Application to DNA

Technical Presentation. IMECE2018-89277

Raushan Singh, Ajeet Kumar, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS

12-10-4 Modeling and Experiments in Nanomechanics and Nanomaterials 4

Third Floor, David L. Lawrence Convention Center, Room 335
10:00am–11:45am

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Jeffrey Kysar, *Columbia University, New York, NY, United States*, Ryan Elliott, *University of Minnesota, Saint Paul, MN, United States*, Yashashree Kulkarni, *University of Houston, Houston, TX, United States*

10:00am – Mechanical Properties of P3HT:PCBM Bulk-Heterojunction Thin Films by Coarse-Grained Molecular Dynamics

Technical Presentation. IMECE2018-86446
Joydeep Munshi, Ganesh Balasubramanian, *Lehigh University, Bethlehem, PA, United States*

10:21am – Effect of Size and Crystallography in SiC Nanowire

Technical Presentation. IMECE2018-89979
Fazle Elahi, Md. Hossain, *University of Delaware, Newark, DE, United States*

10:42am – Crack Deflection-Penetration at a Nanoscale Interface of Graphene/hBN Heterostructure

Technical Presentation. IMECE2018-89981
Tousif Ahmed, Md. Hossain, *University of Delaware, Newark, DE, United States*

11:03am – 2D Crystallization of Poly(Vinyl Alcohol) Monolayer on Graphene Oxide (GO) and Its Role in Improving Interfacial Shear Strength in GO at Different Temperature

Technical Presentation. IMECE2018-89996
Wei Gao, Arman Ghasemi, *University of Texas at San Antonio, San Antonio, TX, United States*

11:24am – In Silico Preparation and Mesoscopic Modelling of Carbon Nanotube Thin Films With Covalent Cross-Links

Technical Presentation. IMECE2018-87658
Alexey Volkov, Md. Abu Horaira Banna, *University of Alabama, Tuscaloosa, AL, United States*

12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES

12-12-1 Mechanics of Thin-Film and Multi-Layer Structures

Fourth Floor, David L. Lawrence Convention Center, Room 404
10:00am–11:45am

Session Chair: Shuodao Wang, *Oklahoma State University, Stillwater, OK, United States*

10:00am – Buckling of a Stiff Thin Film on an Elastic Graded Compliant Substrate

Technical Presentation. IMECE2018-89232
Jizhou Song, *Zhejiang University, Hangzhou, Zhejiang, China*

10:21am – Wrinkling and Cracking/Folding for Multiscale Hierarchical Surface Morphologies

Technical Presentation. IMECE2018-89524
Jianliang Xiao, *University of Colorado Boulder, Boulder, CO, United States*

10:42am – On Bistability of a Plate Driven by Geometric Asymmetry

Technical Presentation. IMECE2018-89980
Guangchao Wan, *Dartmouth College, Hanover, NH, United States*, **Qiaohang Guo,** *Fujian University of Technology, Fuzhou, China*, **Xiaomin Han, Shicheng Huang, Zi Chen,** *Dartmouth College, Hanover, NH, United States*

11:03am – Spontaneous Buckling-Driven Periodic Delamination of Thin Films on Soft Substrates Under Large Compression

Technical Presentation. IMECE2018-89248
Qiuting Zhang, *Temple University, Philadelphia, PA, United States*, **Jie Yin,** *Temple University, Haverford, PA, United States*

11:24am – Understanding the Bending Behaviors of Multilayer 2D Materials

Technical Presentation. IMECE2018-89090
Zhaohai Dai, Nanshu Lu, *University of Texas at Austin, Austin, TX, United States*

12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION

12-19-4 Computational Fluid-Structure Interaction

Fourth Floor, David L. Lawrence Convention Center, Room 402
10:00am–11:45am

Session Chair: Artem Korobenko, *University of Calgary, Calgary, AB, Canada*

10:00am – Isogeometric Analysis of Thermal Multi-Phase Flows and Its Applications to Bubble Dynamics and Manufacturing Processes

Technical Presentation. IMECE2018-89506
Jinhui Yan, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

10:21am – Analysis of the Fluid Motion Induced by a Vibrating Lamina Through Free Surface-Lattice Boltzmann Coupled Method

Technical Paper Publication. IMECE2018-87715
Daniele Chiappini, Giovanni Di Ilio, *University of Rome Niccoló Cusano, Rome, Rome, Italy*, **Gino Bella**, *University of Rome Tor Vergata, Rome, Rome, Italy*

10:42am – Study on Acoustic Phenomena of Drop Impact on Elastic Wall

Technical Presentation. IMECE2018-88974
Wen Cheng, *Beijing Institute of Technology, Beijing, China*

11:03am – Numerical Modeling and Approximation of the Coupling Lamb Wave Propagation With Fluid-Structure Interaction Problem

Technical Paper Publication. IMECE2018-87448
Bhuiyan Shameem Mahmood Ebna Hai, Markus Bause, *Helmut Schmidt University, Hamburg, Germany*

11:24am – Wind Turbine Tower Inspection Improvement and Fatigue Analysis

Technical Presentation. IMECE2018-89071
Afshin H. Zahraee, *Purdue University Northwest, Chicago, IL, United States*

12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

12-28-4 Instabilities in Solids and Structures: Stability of Composites, Foams/Open-Cell Materials
 Third Floor, David L. Lawrence Convention Center, Room 338
10:00am–11:45am

Session Chair: Victor Lefevre, *Northwestern University, Evanston, IL, United States*

Session Co-Chair: George Kardomateas, *Georgia Institute of Technology, Alpharetta, GA, United States*

10:00am – Nonlinear High Order Analysis for the Buckling and Post-Buckling Behavior of Sandwich Composites

Technical Presentation. IMECE2018-89711
Zhangxian Yuan, *Georgia Institute of Technology, Atlanta, GA, United States*, **George Kardomateas**, *Georgia Institute of Technology, Alpharetta, GA, United States*

10:21am – Numerical Modeling of Multiaxial Crushing of Open-Cell Foams

Technical Presentation. IMECE2018-89131
Chenglin Yang, Stelios Kyriakides, *University of Texas at Austin, Austin, TX, United States*

10:42am – Mechanics of Brittle Foams

Technical Presentation. IMECE2018-89735
Sirui Bi, Stavros Gaitanaros, *Johns Hopkins University, Baltimore, MD, United States*

11:03am – Macroscopic Instabilities and Domain Formation in Neo-Hookean Laminates

Technical Presentation. IMECE2018-89307
Joshua Furer, Pedro Ponte Castañeda, *University of Pennsylvania, Philadelphia, PA, United States*

11:24am – Breaking Symmetry in Externally Pressurized Spherical Shells for Imperfection-Insensitive Designs

Technical Presentation. IMECE2018-89888
Xin Ning, *Pennsylvania State University, Urbana, IL, United States*

12-39 DRUCKER MEDAL SYMPOSIUM

12-39-1 Drucker Medal Symposium

Fourth Floor, David L. Lawrence Convention Center, Room 403
10:00am–11:45am

Session Chair: Wei Cai, *Stanford University, Stanford, CA, United States*

10:00am – Properties of the Eshelby Tensor and Existence of the Equivalent Ellipsoidal Inclusion Solution

Technical Presentation. IMECE2018-89382
Wei Cai, *Stanford University, Stanford, CA, United States*, **David Barnett**, *Stanford University, Sunnyvale, CA, United States*

10:21am – Liquid Inclusions in Soft Materials: Capillary Effect, Mechanical Stiffening and Enhanced Electromechanical Response

Technical Presentation. IMECE2018-89074
Sana Krichen, *University of Houston, Houston, TX, United States*, **Liping Liu**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Pradeep Sharma**, *University of Houston, Houston, TX, United States*

10:42am – The Waves of Phase Change

Technical Presentation. IMECE2018-89061
Xanthippi Markenscoff, *University of California, San Diego, La Jolla, CA, United States*

11:03am – A Piezoelectric Inclusion of Arbitrary Shape With Weakly and Highly Conducting Imperfect Interface

Technical Presentation. IMECE2018-89865
Les Sudak, *University of Calgary, Calgary, AB, Canada*, **Daniel McArthur**, *Becht Engineering, Calgary, AB, Canada*

11:24am – Discrete Shear Transformation Zone (STZ) Plasticity

Technical Presentation. IMECE2018-89101
Alan Needleman, Babak Kondori, Manish Vasoya, Ahmed Amine Benzerga, *Texas A&M University, College Station, TX, United States*

12-1 MECHANICS OF SOFT MATERIALS

12-1-5 Mechanics of Soft Materials: Bioinspiration and Biomimetics

Third Floor, David L. Lawrence Convention Center, Room 336
1:45pm–3:30pm

Session Chair: Sung Kang, *Johns Hopkins University, Baltimore, MD, United States*

1:45pm – Slack Lengths of the Bands of the Medial Ulnar Collateral Ligament: Experiment and Model

Technical Presentation. IMECE2018-87494
David Jordan, Mark Carl Miller, *University of Pittsburgh, Pittsburgh, PA, United States, Alexander Kharlamov, Allegheny General Hospital, Pittsburgh, PA, United States*

2:06pm – Understanding the Tunable Adhesion of Wrinkled Surfaces via a Lattice Model

Technical Presentation. IMECE2018-87812
Teng Zhang, *Syracuse University, Syracuse, NY, United States*

2:27pm – Bioinspired Materials With Self-Adaptable Mechanical Properties and Self-Regeneration by Coupling Mechanics and Chemistry Using Soft Stimuli-Responsive Scaffolds

Technical Presentation. IMECE2018-89038
Santiago Orrego, Urszula Krekora, Decheng Hou, Zhezhi Chen, Eugene Kang, Sung Kang, *Johns Hopkins University, Baltimore, MD, United States*

2:48pm – Elasticity as the Basis of Allostery in DNA

Technical Presentation. IMECE2018-89049
Jaspreet Singh, Prashant K. Purohit, *University of Pennsylvania, Philadelphia, PA, United States*

3:09pm – Nonlinear Elasticity of Scale Covered Biomimetic Substrate

Technical Presentation. IMECE2018-89900
Ranajay Ghosh, Hossein Ebrahimi, Hessein Ali, Ryan Horton, *University of Central Florida, Orlando, FL, United States*

12-8 MULTI-SCALE COMPUTATIONS IN FLUIDS, STRUCTURES, AND MATERIALS

12-8-2 Multi-Scale Computations in Fluids, Structures, and Materials 2

Fourth Floor, David L. Lawrence Convention Center, Room 401
1:45pm–3:30pm

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Glaucio Paulino, *University of Illinois at Urbana-Champaign, Urbana, IL, United States, Yucheng Liu, Mississippi State University, Mississippi State, MS, United States*

1:45pm – SH-Waves in 1D Phononic Metamaterials

Technical Presentation. IMECE2018-88301
Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

2:06pm – Thermodynamically Consistent and Physically Motivated Finite Deformation Strain Gradient Plasticity Framework

Invited Presentation. IMECE2018-89259
George Voyiadjis, Yooseob Song, *Louisiana State University, Baton Rouge, LA, United States*

2:48pm – Crystal Orientations Effects of Copper Single Crystals Simulated by LAMMPS Employing Modified Embedded Atomic Method

Technical Presentation. IMECE2018-86284
Yangqing Dou, Yucheng Liu, Mark Horstemeyer, *Mississippi State University, Starkville, MS, United States*

3:09pm – Quantification of Material Degradation due to Voids and Fiber Breakage in Composite Material

Technical Presentation. IMECE2018-89503
Vahid Tavaf, Mohammadsadegh Saadatzai, Sourav Banerjee, *University of South Carolina, Columbia, SC, United States*

12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES

12-12-2 Mechanics of Thin-Film and Multi-Layer Structures

Fourth Floor, David L. Lawrence Convention Center, Room 404
1:45pm–3:30pm

Session Chair: Shuodao Wang, *Oklahoma State University, Stillwater, OK, United States*

1:45pm – Scaling Analyses for Mixed-Mode Transfer of 2D Materials

Technical Presentation. IMECE2018-89425
Shruti Jain, Roger Bonnecaze, Kenneth Liechti, *University of Texas at Austin, Austin, TX, United States*

2:06pm – Modeling the Granular/Metal Multi-Layered Structure of Lithium-Ion Batteries

Technical Presentation. IMECE2018-89467
Juner Zhu, *Massachusetts Institute of Technology, Cambridge, MA, United States, Wei Li, Tsinghua University, Beijing, Beijing, China, Tomasz Wierzbicki, Massachusetts Institute of Technology, Cambridge, MA, United States*

2:27pm – Thermal Shrinkage Behavior of Battery Separator

Technical Paper Publication. IMECE2018-86621
Shutian Yan, *Michigan State University, East Lansing, MI, United States, Jie Deng, Chulheung Bae, Ford Motor Company, Dearborn, MI, United States, Xinran Xiao, Michigan State University, Lansing, MI, United States*

2:48pm – Measuring Adhesion between SiO₂ and 2D Titanium Carbides (MXenes)

Technical Presentation. IMECE2018-89405
Chenglin Wu, Yanxiao Li, Vadym Mochalin, Shuohan Huang, *Missouri University of Science and Technology, Rolla, MO, United States*

3:09pm – Use of a Trilayer Shell Model to Determine Intrinsic Stress Within Titanium-Silicon Carbonitride Coating

Technical Paper Publication. IMECE2018-87929
Anurag Chakraborty, Forest Thompson, Jason Ash, Phil Ahrenkiel, Frank Kustas, Robert Anderson, *South Dakota School of Mines & Technology, Rapid City, SD, United States*

12-17 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING: FAILURE OF ADDITIVELY MANUFACTURED MATERIALS

12-17-1 Failure and Fracture of Additively Manufactured Materials and Structures – 1

Third Floor, David L. Lawrence Convention Center, Room 335
1:45pm–3:30pm

Session Chair: H. Eliot Fang, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: Ashfaq Adnan, *University of Texas at Arlington, Arlington, TX, United States*

1:45pm – Deformation and Failure of an Additively Manufactured Casing With Optimized Graded Lattice Infills

Technical Presentation. IMECE2018-89126

Matthew Lynch, *United Technologies Research Center, East Hartford, CT, United States*, Lin Cheng, Albert To, *University of Pittsburgh, Pittsburgh, PA, United States*

2:06pm – Deformation and Failure of an Additively Manufactured Casing With Optimized Graded Lattice Infills Part II

Technical Presentation. IMECE2018-90000
Matthew Lynch, *United Technologies Research Center, East Hartford, CT, United States*, Lin Cheng, Albert To, *University of Pittsburgh, Pittsburgh, PA, United States*

2:27pm – Topology Optimization Design of Transmission Structure in Flapping-Wing Micro Aerial Vehicle via 3D Printing

Technical Presentation. IMECE2018-88787
Zuyong Chen, Jianghao Wu, *Beihang University, Beijing, Beijing, China*

2:48pm – Predicting Performance and Failure in Additively Manufactured Stainless Steel Parts

Technical Presentation. IMECE2018-89336
Kyle L. Johnson, John M. Emery, Chris I. Hammetter, Judith A. Brown, Spencer Grange, Kurtis R. Ford, Joseph Bishop, *Sandia National Laboratories, Albuquerque, NM, United States*

3:09pm – Prediction of Failure for Multi-Phase Composites Fabricated via Multi-Material 3D Printing

Technical Presentation. IMECE2018-90039
Yaning Li, Lei Lui, Richard Nash, *University of New Hampshire, Durham, NH, United States*

12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

12-28-5 Instabilities in Solids and Structures: Phase Transformations/Transitions and Multi-Stability

Third Floor, David L. Lawrence Convention Center, Room 338
1:45pm–3:30pm

Session Chair: Katia Bertoldi, *Harvard University, Cambridge, MA, United States*

Session Co-Chair: Hiro Tanaka, *Osaka University, Osaka, Japan*

1:45pm – Effect of Phase Transformation on the Stability of Pseudoelastic NiTi Tubes Under Bending

Technical Presentation. IMECE2018-89095
Karlos Kazinakis, Stelios Kyriakides, Chad Landis, *University of Texas at Austin, Austin, TX, United States*

2:06pm – Instability and Self-Folding of One-Dimensional Nanomaterials by Liquid Evaporation

Technical Presentation. IMECE2018-89107
Qingchang Liu, Baoxing Xu, *University of Virginia, Charlottesville, VA, United States*

2:27pm – Propagation of Non-Linear Waves in 2D Mechanical Metamaterials Based on Bistable Shallow Arches

Technical Presentation. IMECE2018-89431
Gabriele Librandi, *Harvard University, Cambridge, MA, United States*, Eleonora Tubaldi, *University of Arizona, Tucson, AZ, United States*, Katia Bertoldi, *Harvard University, Cambridge, MA, United States*

2:48pm – Elastic and Viscoelastic Transition Responses of Specific Repetitive Structural Systems Subjected to Uniaxial Compressive Loading

Technical Presentation. IMECE2018-88760
Hiro Tanaka, Kazutoshi Hamada, Gakuto Yamanokuchi, Yoji Shibutani, *Osaka University, Osaka, Japan*

12-31 MECHANICAL METAMATERIALS

12-31-1 Design of Mechanical Metamaterials

Fourth Floor, David L. Lawrence Convention Center, Room 402
1:45pm–3:30pm

Session Chair: Jongmin Shim, *University at Buffalo, State University of New York, Buffalo, NY, United States*

Session Co-Chair: Jie Yin, *Temple University, Haverford, PA, United States*

1:45pm – Computational Design of Multistable Prismatic Architected Materials

Invited Presentation. IMECE2018-89021
Johannes T.B. Overvelde, Agustin Iniguez-Rabago, *AMOLF, Amsterdam, Netherlands*

2:27pm – Accelerated Search and Design for Stretchable Graphene Kirigami Using Machine Learning

Technical Presentation. IMECE2018-88956

Harold Park, Boston University, Brookline, MA, United States,
Paul Hanakata, Boston University, Boston, MA, United States,
Ekin Cubuk, Google Brain, Mountain View, CA, United States,
David Campbell, Boston University, Boston, MA, United States

2:48pm – Heterogeneously Architected Meta-Structures by Mechanics Design

Technical Presentation. IMECE2018-89033

Baoxing Xu, University of Virginia, Charlottesville, VA, United States

3:09pm – 3D Construction of a Tilted Cuboid Mechanical Metamaterial

Technical Paper Publication. IMECE2018-87050

Yunfang Yang, Zhong You, University of Oxford, Oxford, United Kingdom

12-39 DRUCKER MEDAL SYMPOSIUM

12-39-2 Drucker Medal Symposium

Fourth Floor, David L. Lawrence Convention Center, Room 403
1:45pm–3:30pm

Session Chair: Wei Cai, Stanford University, Stanford, CA, United States

1:45pm – Is There a Universal Exponent for the Activation Energy of Dislocation Nucleation?

Technical Presentation. IMECE2018-89587

Christopher Weinberger, Anik H.M. Faisal, Colorado State University, Fort Collins, CO, United States

2:06pm – A Phase Field Model for Brittle Fracture Based on Homogenization

Technical Presentation. IMECE2018-89188

Yongxing Shen, Cheng Cheng, Shanghai Jiao Tong University, Shanghai, China

2:27pm – Architecture in Biological Materials: A Template for Toughness Enhancement or a Siren Song?

Technical Presentation. IMECE2018-89885

Haneesh Kesari, Brown University, Providence, RI, United States

2:48pm – Dislocation Dynamics Simulations of Materials With Complex Physics

Technical Presentation. IMECE2018-89319

Sylvie Aubry, Lawrence Livermore National Laboratory, Livermore, CA, United States

3:09pm – Probing Defect-Controlled Plasticity at Small Scale via Multiscale Discrete Defect Element Method

Technical Presentation. IMECE2018-89502

Ill Ryu, University of Texas at Dallas, Richardson, TX, United States, Taejoon Park, Ohio State University, Columbus, OH, United States, Cuong Nguyen, University of Texas at Dallas, Richardson, TX, United States, Farhang Pourboghra, Ohio State University, Columbus, OH, United States

12-1 MECHANICS OF SOFT MATERIALS

12-1-6 Mechanics of Soft Materials: Electro/Magneto/Chemo-Mechanics

Third Floor, David L. Lawrence Convention Center, Room 336
3:45pm–5:30pm

Session Chair: Robert L. Lowe, University of Dayton, Dayton, OH, United States

3:45pm – The Effect of Terfenol-D Particles on the Electroactive Properties of PVDF-TrFE Composites

Technical Presentation. IMECE2018-89969

Scott Newacheck, George Youssef, San Diego State University, San Diego, CA, United States

4:00pm – Micro-Mechanical Model for Thermo-Oxidative Aging of Elastomers

Technical Paper Publication. IMECE2018-88109

Hamid Mohammadi, Roozbeh Dargazany, Michigan State University, East Lansing, MI, United States

4:15pm – Chemo-Mechanically Coupled Constitutive Model for High Temperature Oxidation in Polymers

Technical Presentation. IMECE2018-89009

Shabnam Konica, Trisha Sain, Michigan Technological University, Houghton, MI, United States

4:30pm – Adaptable Liquid Crystal Elastomers With Transesterification-Based Bond Exchange Reactions

Technical Presentation. IMECE2018-89235

Kai Yu, University of Colorado Denver, Denver, CO, United States

4:45pm – Large-Strain Constitutive Modeling of Soft Multiferroic Magnetolectric Materials

Technical Presentation. IMECE2018-89583

Robert L. Lowe, Hafez Tari, University of Dayton, Dayton, OH, United States

5:00pm – Modeling Hysteresis in Magneto/Electro-Active, Soft Elastomeric, and Shape Memory Materials

Technical Presentation. IMECE2018-89647

Hafez Tari, University of Dayton, Dayton, OH, United States

12-8 MULTI-SCALE COMPUTATIONS IN FLUIDS, STRUCTURES, AND MATERIALS

12-8-3 Multi-Scale Computations in Fluids, Structures, and Materials 3

Fourth Floor, David L. Lawrence Convention Center, Room 401
3:45pm–5:30pm

Session Chair: Yozo Mikata, *Bechtel, Niskayuna, NY, United States*

Session Co-Chairs: Glaucio Paulino, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Huijuan Zhao, *Clemson University, Clemson, SC, United States*, Ahmad Najafi, *Drexel University, Philadelphia, PA, United States*

3:45pm – Multi-Scale Design of Periodic Nonlinear Materials Using a Gradient-Based Shape Optimization

Technical Presentation. IMECE2018-88080

Ahmad Najafi, *Drexel University, Philadelphia, PA, United States*, Masoud Safdari, *University of Illinois at Urbana-Champaign, Champaign, IL, United States*

4:06pm – Constructal Approach for Stability Analysis of Initially Twisted Beam Under Distributed Follower Forces

Technical Presentation. IMECE2018-88020

Shanae Powell, Ehsan Izadpanahi, Siavash Rastkar, *Florida International University, Miami, FL, United States*, Pezhman Mardanpour, *Florida International University, Weston, FL, United States*

4:27pm – Analysis of Parametric Uncertainty and Sensitivity in Multi-Scale Modeling of Shock Response of a Pressed Energetic Material

Technical Presentation. IMECE2018-89057

Sangyup Lee, Oishik Sen, Nirmal Kumar Rai, H.S. Udaykumar, *University of Iowa, Iowa City, IA, United States*

4:48pm – Molecular Dynamics Simulation on Fused Silica Under Shock Impact

Technical Presentation. IMECE2018-89569

Huijuan Zhao, *Clemson University, Clemson, SC, United States*

5:09pm – Development and Computational Analysis Evaluation of Miscible Fluids Into a Flow Mixer

Technical Presentation. IMECE2018-89048

Jeniffer A.M. Lopes, Altibano Ortenzi, *Londrina State University, Londrina, Paran, Brazil*

12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES

12-12-3 Mechanics of Thin-Film and Multi-Layer Structures

Fourth Floor, David L. Lawrence Convention Center, Room 404
3:45pm–5:30pm

Session Chair: Shuodao Wang, *Oklahoma State University, Stillwater, OK, United States*

3:45pm – Composite Fabric Blankets for Plastic Gears

Technical Paper Publication. IMECE2018-86074

Hany Ghoneim, Alfonso Fuentes-Aznar, Sachin Kini, *Rochester Institute of Technology, Rochester, NY, United States*

4:00pm – Vacancy Engineering and Phase Transformation in Zirconium Thin Films

Technical Presentation. IMECE2018-86351

Zahabul Islam, Baoming Wang, *Pennsylvania State University, State College, PA, United States*, Md. Haque, *Pennsylvania State University, University Park, PA, United States*

4:15pm – Numerical Prediction of Fatigue Life of Composite Hybrid Joint

Technical Presentation. IMECE2018-89913

Shah Alam, Vishveshwara Chitturi, *Texas A&M University - Kingsville, Kingsville, TX, United States*

4:30pm – Indentation-Induced Deformation and Damage in Metal-Ceramic Multilayer Thin Films

Technical Presentation. IMECE2018-86239

Yu-Lin Shen, *University of New Mexico, Albuquerque, NM, United States*

4:45pm – Experimental Research on Tensile and Tearing of Thin-Wall Polymer Scraps of End-of-Life Vehicles and Household Appliances

Technical Paper Publication. IMECE2018-86036

Jianxiong Liu, *Kunming University of Science and Technology, Kunming, Yunnan, China*, Anmin Chang, *Valmont Industries (China) Ltd., Shanghai, Shanghai, China*, Wei Liu, *Kunming University of Science and Technology, Kunming, Yunnan, China*

5:00pm – Finite Element Simulation of Cracks Propagation in Rolling Contact Applications With and Without Coating Applied in Industrial Field

Technical Paper Publication. IMECE2018-86308

Monzer Al Esber, *University of Balamand, Tripoli, Lebanon North, Lebanon*, Gabi Nehme, *University of Balamand, El-Koura, Lebanon North, Lebanon*

12-13 RECENT ADVANCES AND APPLICATIONS IN MESHFREE AND PARTICLE METHODS

12-13-2 Recent Advances and Applications in Meshfree and Particle Method

Third Floor, David L. Lawrence Convention Center, Room 338
3:45pm–5:30pm

Session Chair: C.T. Wu, *Livermore Software Technology Corporation, Livermore, CA, United States*

Session Co-Chair: Michael Hillman, *Pennsylvania State University, University Park, PA, United States*

3:45pm – Gradient Reproducing Kernel Collocation Method for High Order PDEs

Technical Presentation. IMECE2018-88725

Sheng-Wei Chi, Ashkan Mahdavi, *University of Illinois at Chicago, Chicago, IL, United States*

4:00pm – A Coupled Immersed IGA-RKPM Formulation for Air-Blast-Structure Interaction

Technical Presentation. IMECE2018-89855

Georgios Moutsanidis, *University of California, San Diego, San Diego, CA, United States*, **Yuri Bazilevs,** *Brown University, Providence, RI, United States*

4:15pm – The Conforming Reproducing Kernel Method for an Agile Design-to-Simulation Workflow

Technical Presentation. IMECE2018-90041

Jacob Koester, *Sandia National Laboratories, Albuquerque, NM, United States*, **Jiun-Shyan Chen,** *University of California, San Diego, La Jolla, CA, United States*, **Michael Tupek, Scott Mitchell, Joseph Bishop,** *Sandia National Laboratories, Albuquerque, NM, United States*

4:30pm – A Conforming Reproducing Kernel Finite Volume Method

Technical Presentation. IMECE2018-89884

Michael Hillman, *Pennsylvania State University, University Park, PA, United States*, **Saili Yang,** *Pennsylvania State University, State College, PA, United States*

4:45pm – Advances in RVE Large Deformation Analysis of Heterogeneous Structures Using an Immersed Particle Modeling Method and Mechanistic Machine Learning Technology

Technical Presentation. IMECE2018-88773

Zeliang Liu, C.T. Wu, *Livermore Software Technology Corporation, Livermore, CA, United States*

5:00pm – A Comparison Between ANCF and SPH Methods for Liquid Sloshing Problems

Technical Presentation. IMECE2018-89660

Mohammed Mujtaba Atif, Emanuele Grossi, *University of Illinois at Chicago, Chicago, IL, United States*

12-17 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING: FAILURE OF ADDITIVELY MANUFACTURED MATERIALS

12-17-2 Failure and Fracture of Additively Manufactured Materials and Structures – 2

Third Floor, David L. Lawrence Convention Center, Room 335
3:45pm–5:30pm

Session Chair: Ashfaq Adnan, *University of Texas Arlington, Arlington, TX, United States*

Session Co-Chair: H. Eliot Fang, *Sandia National Laboratories, Albuquerque, NM, United States*

3:45pm – Role of Build Architecture and Loading Rate on Quasi-Static and Dynamic Fracture Behaviors of Additively Printed ABS Studied Using DIC

Technical Presentation. IMECE2018-87028

John P. Isaac, Hareesh Tippur, *Auburn University, Auburn, AL, United States*

4:06pm – Characterizing the Increase in Inter-Bead Bond Strength of FDM Parts Due to Thermal Annealing

Technical Presentation. IMECE2018-89193

Rhugdhriya Rane, Robert M. Taylor, *University of Texas at Arlington, Arlington, TX, United States*

4:27pm – AFM Analysis of Polybutadiene Distribution in the Weld Zones of FDM-Printed ABS Dogbones

Technical Presentation. IMECE2018-89732

David Collinson, *Northwestern University, Evanston, IL, United States*

4:48pm – Additive Manufacturing and Mechanical Properties of Bonelike Ultra-Light Nanocomposite Structures

Technical Presentation. IMECE2018-89773

Sheikh Ferdous, *University of Massachusetts Dartmouth, Dartmouth, MA, United States*, **Ashfaq Adnan, Sushma Pothana,** *University of Texas at Arlington, Arlington, TX, United States*

5:09pm – Thermal Modeling and Meltpool Monitoring of Laser Melting of SS 17-4 PH

Technical Presentation. IMECE2018-89960

Adrian Lew, *Stanford University, Stanford, CA, United States*

12-31 MECHANICAL METAMATERIALS

12-31-2 Functionality of Mechanical Metamaterials
 Fourth Floor, David L. Lawrence Convention Center, Room 402
 3:45pm–5:30pm

Session Chair: Lifeng Wang, *Stony Brook University, Stony Brook, NY, United States*

Session Co-Chair: Jaehyung Ju, *Shanghai Jiao Tong University, Shanghai, China*

3:45pm – An Origami-Based Metamaterial With Programmable Multi-Stability and Anisotropic Behavior
 Technical Presentation. IMECE2018-87142

Soroush Kamrava, *Northeastern University, Allston, MA, United States*, **Ashkan Vaziri**, *Northeastern University, Boston, MA, United States*

4:06pm – Pseudo-Bistable Mechanics of 3D-Printed Metastructures And Metamaterials With Snap-Through Instabilities

Technical Presentation. IMECE2018-89745
Julien Meaud, Kaikai Che, *Georgia Institute of Technology, Atlanta, GA, United States*

4:27pm – Temperature-Triggered Metamaterial Platforms for Biomedical Applications

Technical Presentation. IMECE2018-89794
Sahab Babaee, Simo Pajovic, Ameya R. Kirtane, Jiuyun Shi, Kaitlyn Hess, Ester Caffarel-Salvador, Joy E. Collins, Siddhartha Tamang, Aniket V. Wahane, Alison M. Hayward, Hormoz Mazdiyasn, Giovanni Traverso, Robert Langer, *Massachusetts Institute of Technology, Cambridge, MA, United States*

4:48pm – Metabiomaterials Based on Minimal Surface Skeletal Nets

Technical Presentation. IMECE2018-89302
Sebastien Callens, DeAmir Abbas Zadpoor, *Delft University of Technology, Delft, Netherlands*

5:09pm – Fabrication, Characterization and Mechanical Behaviors of Three-Dimensional High-Entropy Alloy-Polymer Composite Nanolattices

Technical Presentation. IMECE2018-89230
Xiaoyan Li, Xuan Zhang, *Tsinghua University, Beijing, China*

12-39 DRUCKER MEDAL SYMPOSIUM

12-39-3 Drucker Medal Symposium
 Fourth Floor, David L. Lawrence Convention Center, Room 403
 3:45pm–5:30pm

Session Chair: Wei Cai, *Stanford University, Stanford, CA, United States*

3:45pm – Growth, Characterization and Modeling of Single Crystalline and Bi-Crystalline Thin Films of Gold on Amorphous Insulating Substrates

Technical Presentation. IMECE2018-89374
William Nix, Rui Yang, Rachel Traylor, *Stanford University, Stanford, CA, United States*, **Ill Ryu**, *University of Texas at Dallas, Richardson, TX, United States*, **Jonathan Fan**, *Stanford University, Stanford, CA, United States*

4:06pm – Mechanical Behavior of Solder Interconnects Under High Current Density

Technical Presentation. IMECE2018-89121
Leon Keer, *Northwestern University, Evanston, IL, United States*, **Yao Yao**, *Northwestern Polytechnical University, Xi'an, China*

4:27pm – Mechanics of Metallic Nanowires—Stress Relaxation and Diffusion-Mediated Failure

Technical Presentation. IMECE2018-89385
Horacio D. Espinosa, *Northwestern University, Evanston, IL, United States*, **Wei Cai**, *Stanford University, Stanford, CA, United States*, **Rajaprakash Ramachandramoorthy**, *Northwestern University, Evanston, IL, United States*, **Yanming Wang, Amin Aghaei**, *Stanford University, Palo Alto, CA, United States*, **Gunther Richter**, *Max Planck Institute, Stuttgart, Germany*

4:48pm – Mechanical Properties of Metallic Nanocubes: Bimetallic Interfaces and Controlled Porosity

Technical Presentation. IMECE2018-89102
Wendy Gu, *Stanford University, Palo Alto, CA, United States*, **Mehrdad Kiani, Radhika Patil, Wei Cai, Yifan Wang**, *Stanford University, Stanford, CA, United States*

5:09pm – A New Type of Superelastic and Shape Memory Materials: ThCr₂Si₂-Structured Intermetallic Compound at Small Length Scales

Technical Presentation. IMECE2018-90040
Seok-Woo Lee, *University of Connecticut, Storrs, CT, United States*

WEDNESDAY, NOVEMBER 14

12-1 MECHANICS OF SOFT MATERIALS

12-1-7 Mechanics of Soft Materials: Characterization
Third Floor, David L. Lawrence Convention Center, Room 338
10:00am–11:45am

Session Chair: Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

10:00am – Synchrotron In Situ Tomography Observation of Damage Mechanism Transition in UV Aged Polyamide-6

Technical Presentation. IMECE2018-89616
Kenneth Noel Cundiff, *Texas A&M University, College Station, TX, United States*, **Yazid Madi**, *Mines ParisTech, Paris, France*, **Ahmed Amine Benzerga**, *Texas A&M University, College Station, TX, United States*

10:21am – Limitations of Tensile Test for Modeling Complex Deformations of Hyperelastic Materials

Technical Presentation. IMECE2018-89014
Kshitiz Upadhyay, Ghatu Subhash, Douglas Spearot, *University of Florida, Gainesville, FL, United States*

10:42am – Novel AFM-Based Dynamic Indentation Experiments to Capture Local Viscoelastic Mechanical Property Distributions in Soft Heterogeneous Materials

Technical Presentation. IMECE2018-89653
Pavan Kolluru, *Duke University, Durham, NC, United States*, **Matthew Eaton, David Collinson, David Delgado, Kenneth Shull**, *Northwestern University, Evanston, IL, United States*, **L. Catherine Brinson**, *Duke University, Durham, NC, United States*

11:03am – High Strain Rate Dynamic Behavior of Mechanophore Embedded Silicone Elastomers

Technical Presentation. IMECE2018-89750
Logan Shannahan, *Army Research Laboratory, Aberdeen, MD, United States*, **James Berry**, *SURVICE Engineering, Inc., Aberdeen Proving Ground, MD, United States*, **Yangju Lin, Meredith Barbee, Stephen Craig**, *Duke University, Durham, NC, United States*, **Muge Fermen-Coker**, *Army Research Laboratory, Aberdeen Proving Ground, MD, United States*

11:24am – Characterization of a Polyurea Microsphere Reinforced Polyurea Matrix Composite

Technical Presentation. IMECE2018-89766
Sophia Do, George Youssef, *San Diego State University, San Diego, CA, United States*

12-4 MECHANICS OF ADHESION AND FRICTION

12-4-1 Mechanics of Adhesion and Friction

Fourth Floor, David L. Lawrence Convention Center, Room 402
10:00am–11:45am

Session Chair: Jianliang Xiao, *University of Colorado Boulder, Boulder, CO, United States*

10:00am – Mechanics of Adhesion and Friction in 2D Materials

Invited Presentation. IMECE2018-89143
Frank DelRio, *National Institute of Standards and Technology, Louisville, CO, United States*, **Bien-Cuong Tran Khac, Koo-Hyun Chung**, *University of Ulsan, Ulsan, Korea (Republic)*

10:42am – Frictional Characteristics of Graphene Wrapped Nanodiamond and Graphitized Nanodiamond Using Molecular Dynamics Simulation

Technical Presentation. IMECE2018-89928
Srilok Srinivasan, *Iowa State University, Ames, IA, United States*, **Diana Berman**, *University of North Texas, Denton, TX, United States*, **Ganesh Balasubramanian**, *Lehigh University, Bethlehem, PA, United States*, **Subramanian K.R.S. Sankaranarayanan**, *Argonne National Laboratory, Lemont, IL, United States*, **Ali Erdemir**, *Argonne National Laboratory, Argonne, IL, United States*, **Anirudha Sumant**, *Argonne National Laboratory, Lemont, IL, United States*

11:03am – Nanoscale Probing of Interaction in Atomically Thin Layered Materials

Technical Presentation. IMECE2018-88319
Hossein Rokni, Wei Lu, *University of Michigan, Ann Arbor, MI, United States*

11:24am – Atomic-Scale Tribology Elucidated by In Situ Approaches

Technical Presentation. IMECE2018-89544
Robert W. Carpick, *University of Pennsylvania, Philadelphia, PA, United States*

12-7 MULTISCALE MODELS AND EXPERIMENTAL TECHNIQUES FOR COMPOSITE MATERIALS AND STRUCTURES

12-7-1 Multiscale Models and Experimental Techniques for Composite Materials and Structures
Fourth Floor, David L. Lawrence Convention Center, Room 403
10:00am–11:45am

Session Chair: Dianyun Zhang, *University of Connecticut, Storrs, CT, United States*

10:00am – Damage Characterization of Carbon and Glass Fiber Composite Plates Subjected to Low-Velocity Impact Using Thermography

Technical Paper Publication. IMECE2018-86543
Khaled Al-Athel, *King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia*, **Ahmed Alomari**, *Saudi Aramco, Dammam, Saudi Arabia*, **Abul Fazal M. Arif**, *King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia*

10:21am – Analysis of Coated Fibrous Multiferroic Composites Subjected to Large Electric Driving Field

Technical Presentation. IMECE2018-86968
Sheng-hsiang Chen, Chien-hong Lin, *National Cheng Kung University, Tainan, Taiwan*

10:42am – Utility of 2D Finite Element Simulations for Predicting Effective Thermomechanical Properties of Particle-Reinforced Composites

Technical Paper Publication. IMECE2018-87031
Kamran Makarian, *Villanova University, Ardmore, PA, United States*, **Sridhar Santhanam**, *Villanova University, Collegeville, PA, United States*

11:03am – Development of Novel Compact Compression Specimen for Matrix Compression Damage Initiation and Propagation Behavior in Fiber Reinforced Composites

Technical Paper Publication. IMECE2018-87106
Tim McKinley, Kevin Carpenter, John P. Parmigiani, *Oregon State University, Corvallis, OR, United States*

11:24am – A Multi-Scale Processing Model for Predicting Cure-Induced Residual Stress in Thermoset Composites

Technical Presentation. IMECE2018-89866
Weijia Chen, Dianyun Zhang, *University of Connecticut, Storrs, CT, United States*

12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES

12-12-4 Mechanics of Thin-Film and Multi-Layer Structures

Fourth Floor, David L. Lawrence Convention Center, Room 404
10:00am–11:45am

Session Chair: Shuodao Wang, *Oklahoma State University, Stillwater, OK, United States*

10:00am – An Analysis of Metal-Composite Hybrid Joint for Static Loading

Technical Presentation. IMECE2018-89625
Shah Alam, Ulan Dakeev, Mohammad Saquib, *Texas A&M University - Kingsville, Kingsville, TX, United States*

10:21am – Effects of Plasticity on the Creeping Process in the Manufacturing of Tissue Paper

Technical Presentation. IMECE2018-89265
Kui Pan, A. Srikantha Phani, Sheldon Green, *University of British Columbia, Vancouver, BC, Canada*

10:42am – Experimental investigation into Energy Amplification in Tri-Layer Polymer/Polymer Composites

Technical Presentation. IMECE2018-89958
George Youssef, Brian Wang, *San Diego State University, San Diego, CA, United States*

11:03am – Study on Dynamic Performance of the Non-Circular Bearings Using Fourier Analysis

Technical Paper Publication. IMECE2018-88420
Jiale Tian, Baisong Yang, Lie Yu, Jian Zhou, *Xi'an Jiaotong University, Xi'an, China*

11:24am – Research on Topology Optimization of Level Set Method Based on Incompatible Element

Technical Presentation. IMECE2018-88915
Dongyue Qu, Haibing Zhang, Jianan Xu, Qiang Chen, *Harbin Engineering University, Harbin City, China*

12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS

12-21-1 Fatigue Modeling in Engineering Materials

Fourth Floor, David L. Lawrence Convention Center, Room 405
10:00am–11:45am

Session Chair: Ke Li, Schlumberger, Sugar Land, TX, United States

Session Co-Chair: Huijuan Zhao, Clemson University, Clemson, SC, United States

10:00am – Characterizing the Fatigue Behavior of Wrought Fe-Co-2V Using Experimental, Computational, and Analytical Techniques

Technical Presentation. IMECE2018-89185

Matthew J. Mills, University of California, Davis, Davis, CA, United States, **Jacob Biddlecom**, Clemson University, Clemson, SC, United States, **Benedict Pineyro**, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States, **Tariq Khraishi**, University of New Mexico, Albuquerque, NM, United States, **Kyle L. Johnson**, **Scott Grutzik**, **Adam Brink**, Sandia National Laboratories, Albuquerque, NM, United States, **Matthew Brake**, Rice University, Houston, TX, United States

10:21am – Numerical Evaluation of Fatigue Crack Growth in Ionomer Membrane Based on Plastically Dissipated Energy

Technical Presentation. IMECE2018-89674

Morshed Hasan, University of Delaware, Newark, DE, United States, **Jixin Chen**, Ford Motor Company, Dearborn, MI, United States, **Anette Karlsson**, Cleveland State University, Cleveland, OH, United States, **Michael Santare**, University of Delaware, Newark, DE, United States

10:42am – Fatigue Life Prediction of Cold Rolled Rotary Shouldered Threaded Connections

Technical Paper Publication. IMECE2018-87801

Fei Song, **Michael Du**, **Ke Li**, Schlumberger, Sugar Land, TX, United States

11:03am – Mechanics of Fatigue Failure of Aluminum Center Crack Tension Specimens and Repair Using Low Modulus Composite Patches

Technical Presentation. IMECE2018-87205

Hugh Bruck, University of Maryland, College Park, MD, United States, **Daniel Hart**, **Paul Lara**, NSWC Carderock, West Bethesda, MD, United States

12-31 MECHANICAL METAMATERIALS

12-31-3 Mechanics of Mechanical Metamaterials

Fourth Floor, David L. Lawrence Convention Center, Room 401
10:00am–11:45am

Session Chair: Eduard Karpov, University of Illinois at Chicago, Glenview, IL, United States

Session Co-Chair: Sung Kang, Johns Hopkins University, Baltimore, MD, United States

10:00am – Auxetic Composite Metamaterials With Enhanced Mechanical Properties

Technical Presentation. IMECE2018-89285

Lifeng Wang, Stony Brook University, Stony Brook, NY, United States

10:21am – Study on the Phononic Band-Structure of Soft Granular Crystals

Technical Presentation. IMECE2018-89097

Nidhish Jain, **Jongmin Shim**, University at Buffalo, State University of New York, Buffalo, NY, United States

10:42am – Undulated Lattice Structures by Vertices – Torsion for Elastic Wave Filtering

Technical Presentation. IMECE2018-89091

Zhihao Yuan, **Jaehyung Ju**, Shanghai Jiao Tong University, Shanghai, China

11:03am – Strain Energy Transformation Pathways in Highly Nonlocal Mechanical Metamaterials

Technical Presentation. IMECE2018-89974

Eduard Karpov, University of Illinois at Chicago, Glenview, IL, United States, **Larry Danso**, **John Klein**, University of Illinois at Chicago, Chicago, IL, United States

11:24am – Mimicking Pseudo-Elastic Behavior and Shape Memory Effect Using Architected Metamaterials

Technical Presentation. IMECE2018-87239

Yunlan Zhang, **Mirian Velay**, **Kristiaan Hector**, Purdue University, West Lafayette, IN, United States, **David Restrepo**, San Antonio University, San Antonio, TX, United States, **Nilesh Mankame**, General Motors Research & Development, Warren, MI, United States, **Pablo Zavattieri**, Purdue University, West Lafayette, IN, United States

12-1 MECHANICS OF SOFT MATERIALS

12-1-8 Mechanics of Soft Materials: Fracture, Dissipation, and Self-Healing

Third Floor, David L. Lawrence Convention Center, Room 338
1:45pm–3:30pm

Session Chair: Aurelie Azoug, Oklahoma State University, Stillwater, OK, United States

1:45pm – Self-Healing Mechanics of Soft Polymers

Technical Presentation. IMECE2018-89726

Qiming Wang, University of Southern California, Los Angeles, CA, United States

2:06pm – Material Sink Approach for Modeling Fracture of Soft Solids

Technical Presentation. IMECE2018-89031
Konstantin Volokh, *Technion - Israel Institute of Technology, Haifa, Israel*

2:27pm – A Gradient Damage Model of Polydisperse Polymers

Technical Presentation. IMECE2018-89388
Bin Li, Nikolaos Bouklas, *Cornell University, Ithaca, NY, United States*

2:48pm – Dissipations in Liquid Crystal Elastomers at the Nematic-Isotropic Transition

Technical Presentation. IMECE2018-89590
Aurelie Azoug, Jeb Wallace, *Oklahoma State University, Stillwater, OK, United States*

3:09pm – Rehealable, Fully Recyclable and Malleable Electronic Skin Enabled by Dynamic Covalent Thermoset Nanocomposite

Technical Presentation. IMECE2018-89639
Zhanan Zou, Jianliang Xiao, *University of Colorado Boulder, Boulder, CO, United States*

12-4 MECHANICS OF ADHESION AND FRICTION

12-4-2 Mechanics of Adhesion and Friction

Fourth Floor, David L. Lawrence Convention Center, Room 402
1:45pm–3:30pm

Session Chair: Chenglin Wu, *Missouri University of Science and Technology, Rolla, MO, United States*

1:45pm – Atomic Scale Friction in DNA Plectonemes

Technical Presentation. IMECE2018-89023
Prashant K. Purohit, Yifei Min, *University of Pennsylvania, Philadelphia, PA, United States*

2:06pm – Surface Roughness Dependent Adhesion: Finite Element Modeling and Analysis

Technical Presentation. IMECE2018-89081
Weilin Deng, Haneesh Kesari, *Brown University, Providence, RI, United States*

2:27pm – Crater-enabled dry adhesion

Technical Presentation. IMECE2018-89209
Liu Wang, Kyoung Ho Ha, Shutao Qiao, Nanshu Lu, *University of Texas at Austin, Austin, TX, United States*

2:48pm – Characterizing Adhesion of Silver Nano Wire Graphene Composite in Multi-Layered Structure

Technical Presentation. IMECE2018-89403
Chenglin Wu, Yanxiao Li, Congjie Wei, *Missouri University of Science and Technology, Rolla, MO, United States*

3:09pm – Tunable Dry Adhesion of Elastomeric Posts Enabled by Stiffness Tuning of Microfluidic Serpentine Channel of LMPA

Technical Presentation. IMECE2018-89834
Amir Mohammadi Nasab, *University of Nevada, Reno, Reno, NV, United States*, Patrick Stampfli, *NevadaNano, Sparks, NV, United States*, Aoyi Luo, Kevin Turner, *University of Pennsylvania, Philadelphia, PA, United States*, Wanliang Shan, *University of Nevada Reno, Reno, NV, United States*

12-7 MULTISCALE MODELS AND EXPERIMENTAL TECHNIQUES FOR COMPOSITE MATERIALS AND STRUCTURES

12-7-2 Multiscale Models and Experimental Techniques for Composite Materials and Structures
Fourth Floor, David L. Lawrence Convention Center, Room 403
1:45pm–3:30pm

Session Chair: Dianyuan Zhang, *University of Connecticut, Storrs, CT, United States*

1:45pm – Effective Property Estimation of CMC Minicomposites Considering Porosity

Technical Paper Publication. IMECE2018-87337
Abhilash M. Nagaraja, Suhasini Gururaja, *Indian Institute of Science, Bangalore, Karnataka, India*

2:06pm – Phantom-Element Technique for Periodic Deformation Analysis of Plain Fabrics Using LS-DYNA

Technical Paper Publication. IMECE2018-87459
Hikaru Miyaki, Atsushi Sakuma, *Kyoto Institute of Technology, Kyoto, Japan*

2:27pm – Evaluation of Transverse Shear Moduli of Composite Sandwich Beams Through Three-Point Bending Tests

Technical Paper Publication. IMECE2018-87636
Ozgun Sener, Oguzhan Dede, Oguz Atalay, *Middle East Technical University, Ankara, Turkey*, Mert Atasoy, *ASELSAN Inc., Ankara, Turkey*, Altan Kayran, *Middle East Technical University, Ankara, Turkey*

2:48pm – A Combined CFD-Solid Finite Element Model to Study the Mechanics of Sand Erosion Damage in Coated Glass Fiber Reinforced Polymer

Technical Paper Publication. IMECE2018-87966
Mohamed Tawfik Eraky, Tarek Elmelegy, Mostafa Shazly, Nabil Eltayeb, *British University in Egypt, Cairo, Egypt*

3:09pm – Multiscale Simulation of Uni-Directional Carbon Fiber Reinforced Polymer Composites

Technical Presentation. IMECE2018-89956
Mahsa Tajdari, Wing Liu, *Northwestern University, Evanston, IL, United States*

12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS

12-21-2 Fracture Modeling in Engineering Materials
Fourth Floor, David L. Lawrence Convention Center, Room 405
1:45pm–3:30pm

Session Chair: Rui Zhang, *University of Texas at Dallas, Richardson, TX, United States*

Session Co-Chair: Qingda Yang, *University of Miami, Coral Gables, FL, United States*

1:45pm – 3D Augmented Finite Element Analysis of Coupled Ply Cracking and Delamination in Curved Composite Laminates

Technical Presentation. IMECE2018-89783
Qingda Yang, *University of Miami, Coral Gables, FL, United States*

2:06pm – Multiscale Fracture Simulation Based on Coupled Space-Time Finite Element Method and Peridynamics
Technical Presentation. IMECE2018-89257

Rui Zhang, Shogo Wada, Clint Nicely, Qian Qian, *University of Texas at Dallas, Richardson, TX, United States*

2:27pm – Multiscale Virtual Testing and Validation of a DARPA TuFF Material

Technical Presentation. IMECE2018-89767
Qingda Yang, Garret Nygren, Liang Wang, Ryan Karkkainen, *University of Miami, Coral Gables, FL, United States*

2:48pm – Numerical Simulation of Lithiation Driven Phase-Change and Fracture in Silicon

Technical Presentation. IMECE2018-89851
Ataollah Mesgarnejad, Alain Karma, *Northeastern University, Boston, MA, United States*

12-29 PERIDYNAMIC MODELING OF MATERIALS—BEHAVIOR

12-29-1 Peridynamic Modelling and Analysis
Fourth Floor, David L. Lawrence Convention Center, Room 404
1:45pm–3:30pm

Session Chair: Hailong Chen, *University of Kentucky, Lexington, KY, United States*

Session Co-Chairs: Erdogan Madenci, *University of Arizona, Tucson, AZ, United States*, Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

1:45pm – Study of Spurious Wave Reflection at the Interface of Peridynamics and Finite Element Regions

Technical Paper Publication. IMECE2018-86129
Shank S. Kulkarni, *University of North Carolina at Charlotte, Charlotte, NC, United States*, **Xiaonan Wang**, *ANSYS, Cannonsburg, PA, United States*, **Alireza Tabarraei**, *University of North Carolina at Charlotte, Charlotte, NC, United States*

2:06pm – Peridynamic Modelling of Crack Nucleation
Technical Presentation. IMECE2018-88149
Sina Niazi, Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

2:27pm – Peridynamics as a Module in the MOOSE Framework

Technical Presentation. IMECE2018-89098
Hailong Chen, *University of Kentucky, Lexington, KY, United States*, **Benjamin Spencer**, *Idaho National Laboratory, Idaho Falls, ID, United States*

2:48pm – Peridynamic Unit Cell for Effective Properties of Different Microstructure Scales

Technical Presentation. IMECE2018-89683
Erdogan Madenci, *University of Arizona, Tucson, AZ, United States*, **Atila Barut, Amin Yaghoobi**, *Global Engineering Research and Technologies, Tucson, AZ, United States*, **Nam Phan**, *Naval Air Systems Command (NAVAIR), Patuxent River, MD, United States*

12-31 MECHANICAL METAMATERIALS

12-31-4 Reconfigurable Mechanical Metamaterials
Fourth Floor, David L. Lawrence Convention Center, Room 401
1:45pm–3:30pm

Session Chair: Jie Yin, *Temple University, Haverford, PA, United States*

Session Co-Chair: Yaning Li, *University of New Hampshire, Durham, NH, United States*

1:45pm – The Connection Effect of a Snapology-Based Modular Origami Structure on Its Reconfigurability

Technical Presentation. IMECE2018-89119
Kai Xiao, Jaehyung Ju, *Shanghai Jiao Tong University, Shanghai, China*

2:06pm – Design of Reconfigurable Kirigami Metamaterials
Technical Presentation. IMECE2018-89351

Yanbin Li, Yaoye Hong, *Temple University, Philadelphia, PA, United States*, **Jie Yin**, *Temple University, Haverford, PA, United States*

2:27pm – Kirigami-Inspired Materials for Tunable Mechanical and Adhesive Systems

Technical Presentation. IMECE2018-89798
Doh-Gyu Hwang, Katie Trent, Michael D. Bartlett, *Iowa State University, Ames, IA, United States*

2:48pm – Harnessing Multistable Kirigami for Reconfigurable Mechanical Metamaterials

Technical Presentation. IMECE2018-89329
Yi Yang, *Boston University, Boston, MA, United States*, **Marcelo Dias**, *Aarhus University, Aarhus, Denmark*, **Douglas Holmes**, *Boston University, Boston, MA, United States*

3:09pm – Geometric Role in Designing Pneumatically Actuated Pattern-Transforming Metamaterials

Technical Presentation. IMECE2018-89368

Yuzhen Chen, Lihua Jin, *University of California, Los Angeles, Los Angeles, CA, United States*

12-4 MECHANICS OF ADHESION AND FRICTION

12-4-3 Mechanics of Adhesion and Friction

Fourth Floor, David L. Lawrence Convention Center, Room 402
3:45pm–5:30pm

Session Chair: Brian Bush, *National Institute of Standards and Technology, Gaithersburg, MD, United States*

3:45pm – Rate Dependent Tensile and Shear Interactions Between Silicon and Epoxy

Technical Presentation. IMECE2018-89461

Tianhao Yang, Rui Huang, Kenneth Liechti, *University of Texas, Austin, TX, United States*

4:06pm – Development of Empirical Asperity Contact Model for Oil-Lubricated Friction Material

Technical Presentation. IMECE2018-88698

Hiral Haria, *Ford Motor Company, Farmington Hills, MI, United States*, Yuji Fujii, Gregory M. Pietron, *Ford Motor Company, Dearborn, MI, United States*, Masatoshi Miyagawa, Takahiro Tsuchiya, *F.C.C. Co., Ltd., Hamamatsu-Shi, Shizuoka-Ken, Japan*, Shinji Nakamura, Hiroya Miyoshi, *F.C.C. Co., Ltd., Livonia, MI, United States*, Shiyang Hou, Pengchuan Wang, Nikolaos D. Katopodes, *University of Michigan, Ann Arbor, MI, United States*

4:27pm – Interface-Derived Viscoelasticity

Technical Presentation. IMECE2018-88680

Deborah D.L. Chung, *University at Buffalo, State University of New York, Buffalo, NY, United States*

4:48pm – Adhesive Contact of a Weierstrass Surface Profile

Technical Presentation. IMECE2018-86366

Harish Radhakrishnan, Sreekanth Akarapu, *ANSYS Inc., Houston, TX, United States*

5:09pm – Experimental and Numerical Study of Contact Mechanics of Bolted L-Brackets

Technical Presentation. IMECE2018-87033

Samet Emre Yilmaz, *FNSS Defence Systems Inc., Ankara, Turkey*, Altan Kayran, Ercan Gurses, Demirkan Coker, *Middle East Technical University, Ankara, Turkey*

12-5 QUANTITATIVE VISUALIZATION OF FRACTURE AND FAILURE

12-5-1 Quantitative Visualization Related to Fracture & Crack Growth Processes

Fourth Floor, David L. Lawrence Convention Center, Room 401
3:45pm–5:30pm

Session Chair: Leslie Lamberson, *Drexel University, Philadelphia, PA, United States*

Session Co-Chairs: Natasha Vermaak, *Lehigh University, Bethlehem, PA, United States*, Ryan Berke, *Utah State University, Logan, UT, United States*, Ali Ghahremaninezhad, *University of Miami, Coral Gables, FL, United States*

3:45pm – Identifying the Crack Initiation Site in Polycrystalline Nickel Through Surface Profile Changes Using Scanning White Light Interferometry (SWLI)

Technical Presentation. IMECE2018-87176

jalal fathi sola, Haiying Huang, *University of Texas at Arlington, Arlington, TX, United States*

4:06pm – Disappearance of Strengthened Micro Texture of Modified 9Cr-1Mo Steel Caused by Stress-Induced Acceleration of Atomic Diffusion at Elevated Temperatures

Technical Paper Publication. IMECE2018-87368

Yifan Luo, Hideo Miura, *Tohoku University, Sendai, Miyagi, Japan*

4:27pm – Observation of Cracking and Measurement of Fracture Toughness in Graphite

Technical Presentation. IMECE2018-87962

Cheng Liu, Carl Cady, Bob Stevens, *Los Alamos National Laboratory, Los Alamos, NM, United States*

4:48pm – Crack Tip Fields and Location From Full Field Molecular Dynamics Data

Technical Presentation. IMECE2018-88897

Mark Wilson, Michael Chandross, Scott Grutzik, *Sandia National Laboratories, Albuquerque, NM, United States*

5:09pm – Full-Field Quantitative Visualization of Impact Induced Deformations and Stresses in Ceramics and Glass Using Digital Gradient Sensing

Technical Presentation. IMECE2018-89035

Chengyun Miao, Hareesh Tippur, *Auburn University, Auburn, AL, United States*

12-7 MULTISCALE MODELS AND EXPERIMENTAL TECHNIQUES FOR COMPOSITE MATERIALS AND STRUCTURES

12-7-3 Multiscale Models and Experimental Techniques for Composite Materials and Structures
Fourth Floor, David L. Lawrence Convention Center, Room 403
3:45pm–5:30pm

Session Chair: Dianyun Zhang, *University of Connecticut, Storrs, CT, United States*

3:45pm – Multiscale Reduced Order Modeling of Failure in Composites Based on Discrete Interfaces

Technical Presentation. IMECE2018-88984
Caglar Oskay, Zimu Su, Berkcan Kapusuzoglu, Vanderbilt University, Nashville, TN, United States

4:06pm – Mesoscale Material Strength Characterization for Use in Fracture Modeling

Technical Paper Publication. IMECE2018-88249
Katherine A. Acton, University of St. Thomas, St. Paul, MN, United States, Bahador Bahmani, University of Tennessee, Knoxville, Tullahoma, TN, United States, Reza Abedi, University of Tennessee, Tullahoma, TN, United States

4:27pm – Multiscale Characterization of Fabrication Defects and Their Effects in Composite Structures

Technical Presentation. IMECE2018-88541
Jim Lua, Global Engineering and Materials, Inc., Kendall Park, NJ, United States, Xiaodong Cui, Ali Sadeghirad, Global Engineering and Materials, Inc., Princeton, NJ, United States, Alden Hyde, Ling Liu, Utah State University, Logan, UT, United States

4:48pm – Nacre-Inspired Architected Interface Leads to Structural Materials With Superior Mechanical Properties

Technical Presentation. IMECE2018-89379
Grace X. Gu, University of California, Berkeley, Berkeley, CA, United States, Flavia Libonati, Politecnico di Milano/MIT, Cambridge, MA, United States, Daly Wettermark, Markus Buehler, Massachusetts Institute of Technology, Cambridge, MA, United States

12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS

12-21-3 Material Model and Fracture Theory Development

Fourth Floor, David L. Lawrence Convention Center, Room 405
3:45pm–5:30pm

Session Chair: Alireza Amirkhizi, *University of Massachusetts, Lowell, Lowell, MA, United States*

Session Co-Chair: Kazem Alidoost, *University of Illinois at Urbana-Champaign, Champaign, IL, United States*

3:45pm – Energy Release Rate Approximation for Surface Cracks in Three-Dimensional Domains Using the Topological Derivative

Technical Presentation. IMECE2018-89429
Kazem Alidoost, University of Illinois at Urbana-Champaign, Champaign, IL, United States, Meng Feng, Massachusetts Institute of Technology, Cambridge, MA, United States, Philippe Geubelle, Daniel Tortorelli, University of Illinois at Urbana-Champaign, Urbana, IL, United States

4:06pm – A Constitutive Model for Ductile and Brittle Failures of Semicrystalline Polymers

Technical Presentation. IMECE2018-87750
Anu Tripathi, Susan Mantell, Jia-Liang Le, University of Minnesota, Twin Cities, MN, Minneapolis, MN, United States

4:27pm – Failure of Elastomeric Coatings Under Cavitation Erosion

Technical Presentation. IMECE2018-88401
Alireza Amirkhizi, Vahidreza Alizadeh, University of Massachusetts, Lowell, Lowell, MA, United States

4:48pm – Structural Transitions in Torsionally Constrained DNA and Their Dependence on Solution Electrostatics

Technical Presentation. IMECE2018-89050
Jaspreet Singh, Prashant K. Purohit, University of Pennsylvania, Philadelphia, PA, United States

12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS

12-26-1 Mechanics of Soft Materials and Soft Robots

Third Floor, David L. Lawrence Convention Center, Room 338
3:45pm–5:30pm

Session Chair: Shaoxing Qu, *Zhejiang University, Hangzhou, Zhejiang, China*

3:45pm – Computational Mechanics Modeling of a Continuum Soft Robot

Technical Presentation. IMECE2018-86141
Hongyan Yuan, Bahador Marzban, Richard Sperling, University of Rhode Island, Kingston, RI, United States

4:06pm – Numerical Simulation Tools for Data-Driven Structural Design of Soft Robots

Technical Presentation. IMECE2018-87679

Mohammad Khalid Jawed, Weicheng Huang, *University of California, Los Angeles, Los Angeles, CA, United States*, **Xiaonan Huang, Carmel Majidi**, *Carnegie Mellon University, Pittsburgh, PA, United States*

4:27pm – Constitutive Modeling of Property Evolution During Photopolymerization and 3D Printing

Technical Presentation. IMECE2018-89216

Jiangtao Wu, *Georgia Institute of Technology, Atlanta, GA, United States*, **Zeang Zhao**, *Peking University, Beijing, Beijing, China*, **H. Jerry Qi**, *Georgia Institute of Technology, Atlanta, GA, United States*, **Daining Fang**, *Beijing Institute of Technology, Beijing, Beijing, China*

4:48pm – Addictive Manufacturing: From 3D to 4D Printing

Invited Presentation. IMECE2018-89221

Daining Fang, *Peking University, Beijing, China*, **Weili Song, Haosen Chen**, *Beijing Institute of Technology, Beijing, China*, **Yihui Zhang**, *Tsinghua University, Beijing, China*, **H. Jerry Qi**, *Georgia Institute of Technology, Atlanta, GA, United States*

12-29 PERIDYNAMIC MODELING OF MATERIALS? BEHAVIOR

12-29-2 Peridynamics for Composites, Fracture, and Corrosion Damage

Fourth Floor, David L. Lawrence Convention Center, Room 404

3:45pm–5:30pm

Session Chair: Pablo Seleson, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

Session Co-Chair: Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

3:45pm – Anisotropy in Two-Dimensional and Plane Elasticity Bond-Based Peridynamics

Technical Presentation. IMECE2018-89977

Jeremy Trageser, Pablo Seleson, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

4:06pm – Dynamic Fracture at an Interface: A Peridynamic Analysis

Technical Presentation. IMECE2018-86933

Javad Mehrmashhadi, Quang Le, Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

4:27pm – Peridynamic Modeling of Intergranular Corrosion Damage

Technical Presentation. IMECE2018-86728

Siavash Jafarzadeh, *University of Nebraska–Lincoln, Lincoln, NE, United States*, **Ziguang Chen**, *Huazhong University of Science and Technology, Wuhan, Hubei, China*, **Florin Bobaru**, *University of Nebraska–Lincoln, Lincoln, NE, United States*

4:48pm – The Peridynamic Coupling of Fracture, Diffusion, and Corrosion

Technical Presentation. IMECE2018-88250

Jiangming Zhao, Siavash Jafarzadeh, *University of Nebraska–Lincoln, Lincoln, NE, United States*, **Ziguang Chen**, *Huazhong University of Science and Technology, Wuhan, Hubei, China*, **Florin Bobaru**, *University of Nebraska–Lincoln, Lincoln, NE, United States*

THURSDAY, NOVEMBER 15

12-2 3D PRINTED SOFT MATERIALS

12-2-1 3D Printing of Novel Materials

Third Floor, David L. Lawrence Convention Center, Room 333
8:55am–10:40am

Session Chair: Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

8:55am – Multimaterial 3D Printing Toward Additive Manufacturing Functional Devices Applications

Technical Presentation. IMECE2018-89212

H. Jerry Qi, *Georgia Institute of Technology, Atlanta, GA, United States*

9:37am – Physics and Mechanics in 3D Printing of Advanced Functional Materials

Technical Presentation. IMECE2018-86275

Hyunwoo Yuk, Xuanhe Zhao, *Massachusetts Institute of Technology, Cambridge, MA, United States*

9:58am – Additive Manufacturing of Self-healing Elastomers

Technical Presentation. IMECE2018-89815

Kun Hao Yu, Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

9:48am – 3D Printing Soft Conductors Using Liquid Metals

Technical Presentation. IMECE2018-89916

Taylor Neumann, Michael D. Dickey, *North Carolina State University, Raleigh, NC, United States*

9:38am – Autonomous Actuation of 3D Printed Bistable Beam-Based Structures

Technical Presentation. IMECE2018-88619

Yijie Jiang, Lucia M. Korpas, Jordan R. Raney, *University of Pennsylvania, Philadelphia, PA, United States*

9:59am – Ferromagnetic 4D Printing of Shape-Programmable Soft Active Matter

Technical Presentation. IMECE2018-87182

Yoonho Kim, Hyunwoo Yuk, Ruike Zhao, *Massachusetts Institute of Technology, Cambridge, MA, United States*,

Shawn Chester, *New Jersey Institute of Technology, Newark, NJ, United States*, **Xuanhe Zhao**, *Massachusetts Institute of Technology, Cambridge, MA, United States*

10:20am – Environmentally Responsive Composites Printed by a Multi-Phase 3D Printer

Technical Presentation. IMECE2018-87376

Xiying Li, Jia Ming Zhang, Zhongyi Huang, Pengyu Lv, Xin Yi, Huiling Duan, *Peking University, Beijing, China*

12-3 MECHANICAL CHARACTERIZATION IN EXTREME ENVIRONMENTS

12-3-1 Mechanical Characterization in Extreme Environments I

Third Floor, David L. Lawrence Convention Center, Room 330
8:55am–10:40am

Session Chair: Owen Kingstedt, *University of Utah, Salt Lake City, UT, United States*

Session Co-Chairs: **Natasha Vermaak**, *Lehigh University, Bethlehem, PA, United States*, **Ryan Berke**, *Utah State University, Logan, UT, United States*

8:55am – Amorphization in Boron Carbide: Experimental and Computational Study

Invited Presentation. IMECE2018-89063

Ghatu Subhash, Amnaya Awasthi, *University of Florida, Gainesville, FL, United States*

9:37am – Finite Element Analysis of Thermal Shock Resistance of Refractory Ceramic Composites

Technical Presentation. IMECE2018-87034

Kamran Makarian, *Villanova University, Ardmore, PA, United States*, **Sridhar Santhanam**, *Villanova University, Collegeville, PA, United States*

9:58am – Experimental Evaluation of Effect of Temperature on Puncture Resistance of Glass Fiber Reinforced Polyester Composite

Technical Presentation. IMECE2018-88869

Saad Ahmed, Sanjeev Khanna, *University of Missouri, Columbia, Columbia, MO, United States*

10:19am – High Density Grating Fabrication Techniques for High-Temperature Deformation Measurement

Technical Presentation. IMECE2018-89130

Huimin Xie, Wei He, Bozhao Fan, Xianglu Dai, *Tsinghua University, Beijing, China*

12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS

12-14-1 Plastic Anisotropy Modeling

Room 331 8:55am–10:40am

Session Chair: H. Eliot Fang, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: **Oana Cazacu**, *University of Florida, Shalimar, FL, United States*

8:55am – Continuum Description of Anisotropic Plasticity Based on Lower Scales

Invited Presentation. IMECE2018-86236

Frederic Barlat, *POSTECH, Pohang, Gyeongbuk, Korea (Republic)*

9:37am – A Quantitative Measure of Yield Surface Curvature and Its Effects on Problems in Plasticity
Technical Presentation. IMECE2018-87637

William Scherzinger, *Sandia National Laboratories, Albuquerque, NM, United States*

9:58am – Aspects of Anisotropic Yield Model Form: Calibration and Simulations

Technical Presentation. IMECE2018-87692

Edmundo Corona, William Scherzinger, Charlotte L.B. Kramer, Amanda Jones, *Sandia National Laboratories, Albuquerque, NM, United States*

10:19am – Exploration of Anisotropic Plasticity Models

Technical Presentation. IMECE2018-89602

Jake Ostien, *Sandia National Laboratories, Livermore, CA, United States*, **William Scherzinger, Brian Lester**, *Sandia National Laboratories, Albuquerque, NM, United States*

12-25 MECHANICS AND DESIGN OF CELLULAR MATERIALS

12-25-1 Mechanics and Design of Cellular Materials

Third Floor, David L. Lawrence Convention Center, Room 335
8:55am–10:40am

Session Chair: **Muhammad Ali**, *Ohio University, Athens, OH, United States*

8:55am – A Verified Non-Linear Regression Model for Elastic Stiffness Estimates of Finite Composite Domains Considering Combined Effects of Volume Fractions, Shapes, Orientations, Locations, and Number of Multiple Inclusions

Technical Paper Publication. IMECE2018-86231

Ilige Hage, *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, **Charbel Seif**, *American University of Beirut, Beirut, Lebanon*, **Remi Hage**, *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, **Ramsey Hamade**, *American University of Beirut, Beirut, Riad El Solh, Lebanon*

9:16am – Control of Interfacial Crack Behavior via Internal Lattices in 3D Printed Structures

Technical Presentation. IMECE2018-86563

Chengyang Mo, Jordan R. Raney, *University of Pennsylvania, Philadelphia, PA, United States*

9:37am – Study of Energy Absorption Characteristics of Square Tube With Composite Cellular Core

Technical Paper Publication. IMECE2018-86916

Muhammad Ali, Eboreime Ohioma, Khairul Alam, *Ohio University, Athens, OH, United States*

9:58am – Effect of Discrete Sectional Bonding of Cellular Core on Impact Performance of Square Tubes: A Finite Element Study

Technical Paper Publication. IMECE2018-86921

Muhammad Ali, Eboreime Ohioma, Khairul Alam, *Ohio University, Athens, OH, United States*

10:19am – Perception Thresholding for Noise Removal in Micrographs of Cellular Tissues Acquired by Fluorescence Microscopy

Technical Paper Publication. IMECE2018-87231

Saad Manzur, Mohammad Shawon, Mahmuda Naznin, *Bangladesh University of Engineering & Technology, Dhaka, Dhaka, Bangladesh*, **Tanvir Faisal**, *Northwestern University, Chicago, IL, United States*

12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS

12-26-2 Mechanics of Soft Materials and Soft Robots

Third Floor, David L. Lawrence Convention Center, Room 320
8:55am–10:40am

Session Chair: **Shaoxing Qu**, *Zhejiang University, Hangzhou, Zhejiang, China*

8:55am – Soft Active Materials, Soft Machines, and Mechanics

Technical Presentation. IMECE2018-89191

Shaoxing Qu, *Zhejiang University, Hangzhou, Zhejiang, China*

9:16am – Adhesive Tough Magnetic Hydrogels With High Magnetic Nanoparticle Content

Technical Presentation. IMECE2018-89234

Xiaocheng Hu, Guodong Nian, *Zhejiang University, Hangzhou, China*

9:37am – Monolithic Dual-pH Responsive Copolymer Actuator Inspired by Drosera

Technical Presentation. IMECE2018-89398

Zilong Han, *Zhejiang University, Hangzhou, China*

9:58am – Programmable Wrinkling of Shape Memory Polymers With Applications in Tunable Adhesion and Nonuniform Optical Gratings

Technical Presentation. IMECE2018-89526

Yu Wang, *Houston Methodist Research Institute, Houston, TX, United States*, **Jianliang Xiao**, *University of Colorado Boulder, Boulder, CO, United States*

10:19am – Tunable Dry Adhesion Through Static and Dynamic Stiffness Tuning

Technical Presentation. IMECE2018-89968

Wanliang Shan, *University of Nevada Reno, Reno, NV, United States*, **Kevin Turner**, *University of Pennsylvania, Philadelphia, PA, United States*

12-27 MULTIFUNCTIONAL AND MICRO-/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION

12-27-1 Multifunctional and Micro-/Nanostructured Materials: Modeling and Characterization (I)
Third Floor, David L. Lawrence Convention Center, Room 336
8:55am–10:40am

Session Chair: Xin-Lin Gao, *Southern Methodist University, Dallas, TX, United States*

Session Co-Chair: Haifeng Zhao, *Chinese Academy of Sciences, Beijing, China*

8:55am – Numerical and Experimental Studies on the Development of Variable Density Nanocomposites for Structural Applications

Technical Paper Publication. IMECE2018-87252
Jayaram Pothnis, *Indian Institute of Science, Bangalore, Karnataka, India*, **Dinesh Kalyanasundaram**, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*, **Sahasini Gururaja**, *Indian Institute of Science, Bangalore, Karnataka, India*

9:16am – A New Method for Solving the Fission Gas Diffusion Equation With Time-Varying Diffusion Coefficient and Source Term Considering Recrystallization of Fuel Grains

Technical Presentation. IMECE2018-89576
Yunmei Zhao, Shurong Ding, *Fudan University, Shanghai, China*

9:37am – Mechanical Behavior of Microscale Polycrystalline Silver Pillars

Technical Presentation. IMECE2018-86623
Sadeq Saleh, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Mehdi Hamid, Hussein Zbib**, *Washington State University, Pullman, WA, United States*, **Rahul Panat**, *Carnegie Mellon University, Pittsburgh, PA, United States*

9:58am – Nanoscale Mechanical Characterization of Graphene- and h-BN-Reinforced PMMA

Technical Presentation. IMECE2018-89654
Arab Hammadi, Zhizhong Dong, Bernard Kear, *Rutgers, Piscataway, NJ, United States*, **Stephen Tse**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Assimina Pelegri**, *Rutgers, The State University of New Jersey, East Brunswick, NJ, United States*

12-2 3D PRINTED SOFT MATERIALS

12-2-2 Mechanics of 3D Printed Materials
Third Floor, David L. Lawrence Convention Center, Room 333
10:50am–12:35pm

Session Chair: Kai Yu, *University of Colorado Denver, Denver, CO, United States*

10:50am – Additive Manufacturing and Architected Materials

Technical Presentation. IMECE2018-89696
Christopher M. Spadaccini, *Lawrence Livermore National Laboratory, Livermore, CA, United States*

11:32am – Design of Active Smart Materials via Additive Manufacturing: From Stimuli-Response to Self-Healing

Technical Presentation. IMECE2018-89742
Qiming Wang, *University of Southern California, Los Angeles, CA, United States*

11:53am – 12:14pm – 3D Printing of Electroactive Hydrogel for Soft Robotic Manipulation and Locomotion

Technical Presentation. IMECE2018-89387
Daehoon Han, Cindy Farino, Chen Yang, Tracy Scott, Daniel Browe, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Wonjoon Choi**, *Korea University, Seoul, Korea (Republic)*, **Joseph Freeman, Howon Lee**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

12-3 MECHANICAL CHARACTERIZATION IN EXTREME ENVIRONMENTS

12-3-2 Mechanical Characterization in Extreme Environments II
Third Floor, David L. Lawrence Convention Center, Room 330
10:50am–12:35pm

Session Chair: Ryan Berke, *Utah State University, Logan, UT, United States*

Session Co-Chairs: Natasha Vermaak, *Lehigh University, Bethlehem, PA, United States*, Owen Kingstedt, *University of Utah, Salt Lake City, UT, United States*

10:50am – Location-Specific Dynamic Response of As-Built and Heat-Treated Laser Powder Bed Fusion Inconel 718

Technical Presentation. IMECE2018-89314
Nadia Kouraytem, Raphaël Chanut, Ashley Spear, Owen Kingstedt, *University of Utah, Salt Lake City, UT, United States*

11:11am – Experimental and Numerical Analyses of Uniaxial Shakedown Behavior of 316 Stainless Steel

Technical Presentation. IMECE2018-89790
Ismail Soner Cinoglu, Ali Charbal, Natasha Vermaak, *Lehigh University, Bethlehem, PA, United States*

11:32am – Numerical and Experimental Investigations of Multiaxial Shakedown of Inconel 625 at High Temperature

Technical Presentation. IMECE2018-89812
Ali Charbal, Ismail Soner Cinoglu, Natasha Vermaak, *Lehigh University*

11:53am – A Customized UV Lens for In Situ Measurements at High Temperature and High Magnification

Technical Presentation. IMECE2018-90028

Robert Hansen, Adam Smith, Ren Voie, Ryan Berke, Utah State University, Logan, UT, United States

12:14pm – Effect of Exposure Time on Ultraviolet DIC at Extreme Temperatures

Technical Presentation. IMECE2018-90029

Thin Thai, Robert Hansen, Adam Smith, Utah State University, Logan, UT, United States, Paul Gradl, NASA, Huntsville, AL, United States, Ryan Berke, Utah State University, Logan, UT, United States

12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS**12-14-2 Multi-Scale Modelling of Plastic Anisotropy**Third Floor, David L. Lawrence Convention Center, Room 331
10:50am–12:35pm

Session Chair: William Scherzinger, Sandia National Laboratories, Albuquerque, NM, United States

Session Co-Chair: Brian Lester, Sandia National Laboratories, Albuquerque, NM, United States

10:50am – Plastic Anisotropy of Mg Single Crystal: The Effect of Slip and Twin

Technical Presentation. IMECE2018-86706

Soondo Kweon, Daniel Selvakum Raja, Southern Illinois University Edwardsville, Edwardsville, IL, United States

11:11am – The Relationship Between Average Grain Profile Heights and Plastic Strains in Nickel Polycrystals Under Tensile Plastic Loading

Technical Paper Publication. IMECE2018-88197

Kranthi Balusu, Haiying Huang, University of Texas at Arlington, Arlington, TX, United States

11:32am – Multiscale Modeling of the Plastic Behavior in Single Crystal Tungsten: From Atomistic to Crystal Plasticity Simulations

Technical Presentation. IMECE2018-87626

David Cereceda, Villanova University, Villanova, PA, United States, Martin Diehl, Franz Roters, Dierk Raabe, Max-Planck-Institut für Eisenforschung, Dusseldorf, Germany, Jose Manuel Perlado, Instituto de Fusion Nuclear, Madrid, Spain, Jaime Marian, University of California, Los Angeles, Los Angeles, CA, United States

11:53am – Plastic Anisotropy in Dynamic Impact Tests of Single- and Polycrystalline Tantalum

Technical Presentation. IMECE2018-86499

Hojun Lim, Jay Carroll, Corbett Battaile, Sandia National Laboratories, Albuquerque, NM, United States, Hyuk Jong Bong, Korean Institute of Material Science, Changwon, Korea (Republic), Shuh Rong Chen, Los Alamos National Laboratory, Los Alamos, NM, United States, Matthew Lane, Sandia National Laboratories, Albuquerque, NM, United States

12:14pm – New Polycrystalline Modelling of Textured Sheets

Technical Presentation. IMECE2018-86079

Nitin Chandola, Benoit Revil-Baudard, Oana Cazacu, University of Florida, Shalimar, FL, United States

12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS**12-21-4 Meso-scale Modeling and Material Fracture Characterization**Fourth Floor, David L. Lawrence Convention Center, Room 404
10:50am–12:35pm

Session Chair: Mohsen Asle Zaeem, Colorado School of Mines, Golden, CO, United States

Session Co-Chair: Xiaoyao Peng, Carnegie Mellon University, Pittsburgh, PA, United States

10:50am – A Phase Field Model of Dislocation Dynamics in BCC Crystals

Technical Presentation. IMECE2018-89338

Xiaoyao Peng, Carnegie Mellon University, Pittsburgh, PA, United States, Abigail Hunter, Los Alamos National Laboratory, Los Alamos, NM, United States, Kaushik Dayal, Carnegie Mellon University, Pittsburgh, PA, United States

11:11am – Phase Field Damage Modeling of Mechanical Degradation in Polymers Under Hydro-Thermomechanical Loading Conditions

Technical Presentation. IMECE2018-89456

Vinamra Agrawal, Auburn University, Auburn, AL, United States

11:32am – Quantitative Simulation of Crack Propagation in Single-Phase and Composite Materials by a Modified Phase-Field Model

Technical Presentation. IMECE2018-89051

Arezoo Emdadi, Missouri University of Science and Technology, Rolla, MO, United States, Mohsen Asle Zaeem, Colorado School of Mines, Golden, CO, United States

11:53am – Effective Toughness in Materials With Interfaces

Technical Presentation. IMECE2018-89149

Kaushik Vijaykumar, Haneesh Kesari, Brown University, Providence, RI, United States

12-25 MECHANICS AND DESIGN OF CELLULAR MATERIALS

12-25-2 Mechanics and Design of Cellular Materials
Third Floor, David L. Lawrence Convention Center, Room 335
10:50am–12:35pm

Session Chair: Muhammad Ali, *Ohio University, Athens, OH, United States*

10:50am – Investigation of Non-Pneumatic Tires Based on Helical Hexagonal Cellular Structure

Technical Paper Publication. IMECE2018-87631
Mihir Mangesh Pewekar, Pranit Sandye, Kiran Chaudhari,
Rajiv Gandhi Institute of Technology, Mumbai, Maharashtra, India

11:05am – Behavior of Soft 3D-Printed Auxetic Structures Under Various Loading Conditions

Technical Paper Publication. IMECE2018-87859
Mahmoud Ardebili, Erik Chauca, *Borough of Manhattan Community College/CUNY, New York, NY, United States,*
Kerim Ikkardaslar, CCNY/CUNY, New York, NY, United States, Feridun Delale, *City College of New York, New York, NY, United States*

11:20am – Phase Transitions in a Compressed CNT Forest With Atomic Layer Deposition

Technical Presentation. IMECE2018-89020
Prashant K. Purohit, *University of Pennsylvania, Philadelphia, PA, United States*

11:35am – Unraveling the Mechanical Behavior of Stochastic Cellular Materials at Intermediate Relative Densities

Technical Presentation. IMECE2018-89528
Antonia Antoniou, *Georgia Institute of Technology, Atlanta, GA, United States*

11:50am – Mechanical Properties of a 3D Cellular Structure With Semi-Closed Cells

Technical Presentation. IMECE2018-89619
Hassan Bahaloo, *Northeastern University, Boston, MA, United States, Masoud Olia,* *Wentworth Institute of Technology, Boston, MA, United States, Hamid Nayeb Hashemi,* *Northeastern University, Boston, MA, United States*

12:05pm – 3D Printed Reconfigurable Hybrid Square Lattices for Unique Pattern Transformation Under Bi-Axial Compression

Technical Presentation. IMECE2018-90037
Yaning Li, Yunyao Jiang, *University of New Hampshire, Durham, NH, United States*

12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS

12-26-3 Mechanics of Soft Materials and Soft Robots
Third Floor, David L. Lawrence Convention Center, Room 320
10:50am–12:35pm

Session Chair: Shaoxing Qu, *Zhejiang University, Hangzhou, Zhejiang, China*

10:50am – Impact of the Chamber Shape on a Soft Actuator Mechanism to Mimic the Esophageal Swallowing Process

Technical Paper Publication. IMECE2018-86592
Alberto Caballero Ruiz, Juan Alejandro Hernandez Angulo, Gabriel Ascanio Gasca, Leticia Vega Alvarado, Leopoldo Ruiz Huerta, *Universidad Nacional Autónoma de México, Ciudad de México, Ciudad de México, Mexico, Edmundo Brito-de la Fuente,* *Fresenius Kabi Deutschland GmbH, Bad Homburg, Germany*

11:11am – Integrated Curvature Sensing of Soft Bending Actuators Using Inertial Measurement Units

Technical Paper Publication. IMECE2018-87104
Arthur Seibel, Lars Schiller, *Hamburg University of Technology, Hamburg, Germany*

11:32am – Chemomechanically Controlled Inhomogeneous Large Deformation of a Bi-Layered Spherical Hydrogel

Technical Presentation. IMECE2018-89154
Huiming Wang, *Zhejiang University, Hangzhou, China*

11:53am – Different Mechanical Responses of Soft Adhesion Layer by Partitioning and Initial Defects

Technical Presentation. IMECE2018-89233
Danming Zhong, *Zhejiang University, Hangzhou, Zhejiang, China*

12:14pm – Effects of Defect Size on Cavitation In Gelatin

Technical Presentation. IMECE2018-89397
Yimou Fu, *Zhejiang University, Hangzhou, Zhejiang, China*

12-27 MULTIFUNCTIONAL AND MICRO-/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION

12-27-2 Multifunctional and Micro-/Nano-Structured Materials: Modeling and Characterization (II)
Third Floor, David L. Lawrence Convention Center, Room 336
10:50am–12:35pm

Session Chair: Xin-Lin Gao, *Southern Methodist University, Dallas, TX, United States*

Session Co-Chair: Vinu Unnikrishnan, *University of Alabama, Tuscaloosa, AL, United States*

10:50am – Modelling of Fracture Mechanisms at the Nanoscale Using the Atomistic J-Integral

Invited Presentation. IMECE2018-89174
Samit Roy, Anubhav Roy, *University of Alabama, T AL, United States*

11:32am – Influence of Strain States on the Thermal Transport Properties of Single and Multiwalled Carbon Nanostructures

Technical Paper Publication. IMECE2018-88620
Sushan Nakarmi, Vinu Unnikrishnan, *University of Alabama, Tuscaloosa, AL, United States*

11:53am – Study of Local Interfacial Dielectric Properties in Polymer Nanodielectrics From First Principles

Technical Presentation. IMECE2018-88061
Yumeng Li, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

12:14pm – Band Gaps for Elastic Wave Propagation in a Periodic Composite Beam Structure Incorporating Surface Energy, Transverse Shear and Rotational Inertia Effects

Technical Paper Publication. IMECE2018-87236
Robert Gao, *Greenhill School, Addison, TX, United States*,
Gongye Zhang, Tindaro Ioppolo, *Southern Methodist University, Dallas, TX, United States*

12-41 DYNAMIC FAILURE OF MATERIALS AND STRUCTURES

12-41-1 Dynamic Failure of Materials and Structures

Third Floor, David L. Lawrence Convention Center, Room 321
10:50am–12:35pm

Session Chair: **L. Roy Xu**, *University of New Mexico, Albuquerque, NM, United States*

10:50am – Combining Nanoindentation Tests and Computational Mechanics to Predict Impact Behavior of Composite Laminates

Technical Presentation. IMECE2018-86601
L. Roy Xu, *University of New Mexico, Albuquerque, NM, United States*, **Mark Flores**, *Air Force Research Laboratory, Dayton, OH, United States*

11:11am – Full Frontal Impact Comparison of Steel and Carbon Fiber Composite Front Bumper Crush Can (FBCC) Structures

Technical Paper Publication. IMECE2018-87110
Yash Dixit, Paul Begeman, *Wayne State University, Detroit, MI, United States*, **Golam Newaz**, *Wayne State University, Ann Arbor, MI, United States*, **Derek Board**, *Ford Motor Company, Dearborn, MI, United States*, **Yijung Chen**, *Optimal CAE, Inc., Plymouth, MI, United States*, **Omar Faruque**, *Ford Motor Company, Dearborn, MI, United States*

11:32am – Adhesive Joints Under Impacting Shock Wave Loading

Technical Paper Publication. IMECE2018-87855
Salih Yildiz, Yiannis Andreopoulos, Feridun Delale, *City College of New York, New York, NY, United States*

11:53am – Comparison of Interfacial and Continuum Models for Dynamic Fragmentation Analysis

Technical Paper Publication. IMECE2018-88294
Bahador Bahmani, *University of Tennessee, Knoxville, Tullahoma, TN, United States*, **Reza Abedi**, *University of Tennessee, Tullahoma, TN, United States*, **Philip L. Clarke**, *University of Tennessee, Knoxville, Tullahoma, TN, United States*

12-3 MECHANICAL CHARACTERIZATION IN EXTREME ENVIRONMENTS

12-3-3 Mechanical Characterization in Extreme Environments III

Third Floor, David L. Lawrence Convention Center, Room 330
2:05pm–3:50pm

Session Chair: **Natasha Vermaak**, *Lehigh University, Bethlehem, PA, United States*

Session Co-Chairs: **Owen Kingstedt**, *University of Utah, Salt Lake City, UT, United States*, **Ryan Berke**, *Utah State University, Logan, UT, United States*

2:05pm – Low Temperature Seawater Effects on the Mechanical, Fracture, and Dynamic Behavior of E-Glass and Carbon Fiber Laminates

Technical Presentation. IMECE2018-90056
James LeBlanc, Paul Cavallaro, Jahn Torres, Eric Warner, Andrew Hulton, Ryan Saenger, David Ponte, *Naval Undersea Warfare Center, Newport, RI, United States*

2:26pm – Development of a Single Walled Tank Under Cryogenic Conditions Made of Composite

Technical Paper Publication. IMECE2018-86365
Philipp Werner Kutz, Frank Otremba, Jan Werner, Christian Sklorz, *Bundesanstalt für Materialforschung und -prüfung, Berlin, Berlin, Germany*

2:47pm – Analysis of Temperature Field and Stress Field on Brake Disc During Braking

Technical Paper Publication. IMECE2018-86767
Yu Liu, Xiandong Liu, Yingchun Shan, Tian He, *Beihang University, Beijing, China*

3:08pm – Material Properties of Hybridized Polymer Matrix Composites at Sub-Ambient Temperatures

Technical Presentation. IMECE2018-89709
Matthew Mordasky, Xuemei Wang, *United Technologies Research Center, East Hartford, CT, United States*,
Paul Cavallaro, *Naval Undersea Warfare Center, Newport, RI, United States*, **Mahmoud M. Salama**, *JPS Composite Materials, Anderson, SC, United States*

3:29pm – Mechanical Performance Analysis of ULTEM 9085 in a Heated, Irradiated Environment

Technical Paper Publication. IMECE2018-88181
Matthew Ng, *Pennsylvania State University, State College, PA, United States*, **Sean Brennan**, *Pennsylvania State University, University Park, PA, United States*

12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS

12-14-3 Numerical Modeling With Applications to Forming

Third Floor, David L. Lawrence Convention Center, Room 331
2:05pm–3:50pm

Session Chair: Nitin Chandola, *University of Florida, Shalimar, FL, United States*

Session Co-Chair: Oana Cazacu, *University of Florida, Shalimar, FL, United States*

2:05pm – Effect of the Ratio Between the Yield Stresses in Uniaxial Tension and Pure Shear on the Size of the Plastic Zone Near a Crack

Technical Presentation. IMECE2018-86083
Benoit Revil-Baudard, Oana Cazacu, Nitin Chandola,
University of Florida, Shalimar, FL, United States

2:26pm – Anisotropic Property of Dual-Phase Steel: Measurement and Simulation

Technical Presentation. IMECE2018-89551
Xin Wu, Pengyan Lu, Qingyu Yang, *Wayne State University, Detroit, MI, United States*

2:47pm – Numerical Prediction of the Earing in the Cup Drawing of an AA3104 Aluminum Alloy: Process Conditions Versus Yield Criterion

Technical Presentation. IMECE2018-88998
Marta C. Oliveira, Pedro D. Barros, Diogo M. Neto, *University of Coimbra, Coimbra, Coimbra, Portugal,* **Robert E. Dick,** *Alcoa Technical Center, New Kensington, PA, United States,* **José L. Alves,** *University of Minho, Guimarães, Portugal,* **Luis F. Menezes,** *University of Coimbra, Coimbra, Coimbra, Portugal*

3:08pm – Plasticity-Damage Couplings in Polycrystalline Materials: Importance of Consideration of the Specificities of the Plastic Flow of the Matrix on the Mechanical Response of Porous Solids

Technical Presentation. IMECE2018-86082
Benoit Revil-Baudard, Oana Cazacu, *University of Florida, Shalimar, FL, United States*

12-16 MULTISCALE MODELING AND EXPERIMENTATION OF GEOMATERIALS

12-16-1 Multiscale Modeling and Experimentation of Geomaterials

Third Floor, David L. Lawrence Convention Center, Room 333
2:05pm–3:50pm

Session Chair: Jesse Sherburn, *U.S. Army Engineer Research and Development Center, Vicksburg, MS, United States*

2:05pm – Mesoscale Finite Element Modeling of Concrete Materials

Technical Presentation. IMECE2018-86267
William Lawrimore, Jay Shannon, M.Q. Chandler, Charles A. Burchfield, Zackery B. McClelland, R.D. Moser, *U.S. Army Engineer Research and Development Center, Vicksburg, MS, United States*

2:26pm – Multi Scale Modeling of Rubber Friction on the Rough Pavements Using Finite Element Method

Technical Presentation. IMECE2018-87724
Ashkan Nazari, Arash Nouri, Saied Taheri, Maryam Shakiba, Sunish Vadakkeveetil, *Virginia Tech, Blacksburg, VA, United States,* **Mehran Shams Kondori,** *Virginia Tech, Blacksburg, VA, United States*

2:47pm – Statistical Volume Elements for the Characterization of Angle-Dependent Fracture Strengths

Technical Paper Publication. IMECE2018-88257
Justin Garrard, *University of Tennessee Space Institute, Tullahoma, TN, United States,* **Reza Abedi,** *University of Tennessee, Tullahoma, TN, United States,* **Philip L. Clarke,** *University of Tennessee Space Institute, Tullahoma, TN, United States*

3:08pm – Evaluation of a Computational Model for Ultra-High Performance Concrete in Shear

Technical Presentation. IMECE2018-89022
Andrew Groeneveld, M.Q. Chandler, Robert Walker, C. Kennan Crane, *U.S. Army Engineer Research and Development Center, Vicksburg, MS, United States*

12-20 MULTISCALE MECHANICS OF DUCTILE FAILURE

12-20-1 Multiscale Mechanics of Ductile Failure

Third Floor, David L. Lawrence Convention Center, Room 334
2:05pm–3:50pm

Session Chair: Justin Wilkerson, *Texas A&M University, College Station, TX, United States*

2:05pm – How Plastic Anisotropy Influences Dynamic Failure in Magnesium Alloys

Technical Presentation. IMECE2018-89751
Jeffrey Lloyd, *U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States*

2:26pm – Multiscale Mechanics of Ductile Damage in HCP Materials**Technical Presentation. IMECE2018-89292****Padmeya Prashant Indurkar**, *National University of Singapore, Singapore, Singapore*, **Shailendra Joshi**, *University of Houston, Houston, TX, United States***2:47pm – On the Orientation Dependence of Intergranular Spall Failure****Technical Presentation. IMECE2018-89245****Justin Wilkerson**, **Thao Nguyen**, *Texas A&M University, College Station, TX, United States*, **Darby Luscher**, *Los Alamos National Laboratory, Los Alamos, NM, United States***3:08pm – Dynamics of Necking and Ductile Fracture in Porous Metals****Technical Presentation. IMECE2018-89284****Xin Zhu Zheng**, *Texas A&M University, College Station, TX, United States*, **Komi Espoir N'souglo**, *University Carlos III of Madrid, Leganès, Spain*, **Shmuel Osovski**, *Technion – Israeli Institute of Technology, Haifa, Israel*, **Jose Rodríguez-Martínez**, *University Carlos III of Madrid, Leganès, Spain*, **Ankit Srivastava**, *Texas A&M University, College Station, TX, United States***3:29pm – A Comparative Study of the Dynamic Fragmentation of Non-Linear Elastic and Elasto-Plastic Rings****Technical Presentation. IMECE2018-89276****Alvaro Vaz Romero Santero**, **Jose Rodríguez-Martínez**, *University Carlos III of Madrid, Leganès, Madrid, Spain*, **Sébastien Mercier**, **Alain Molinari**, *University of Lorraine, METZ, Lorraine, France***12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS****12-21-5 Uncertainty Modeling in Fracture and Fatigue****Fourth Floor, David L. Lawrence Convention Center, Room 404
2:05pm–3:50pm****Session Chair:** Sevan Goenezen, *Texas A&M University, College Station, TX, United States***Session Co-Chair:** Bahador Bahmani, *University of Tennessee, Knoxville, Tullahoma, TN, United States***2:05pm – Accelerating Hierarchical Materials Discovery and Design Through a Combined Machine Learning and Experimental Framework****Technical Presentation. IMECE2018-89376****Grace X. Gu**, *University of California, Berkeley, Berkeley, CA, United States*, **Chun-Teh Chen**, **Deon Richmond**, **Markus Buehler**, *Massachusetts Institute of Technology, Cambridge, MA, United States***2:26pm – Establishing Uncertainty Quantification and Propagation Techniques Within a Process-Structure-Property Framework for Uncertainty Informed Materials Design and Development****Technical Presentation. IMECE2018-89201****Gary Whelan**, **David L. McDowell**, *Georgia Institute of Technology, Atlanta, GA, United States***2:47pm – An Integrated Approach for Statistical Microscale Homogenization to Macroscopic Dynamic Fracture Analysis****Technical Paper Publication. IMECE2018-88429****Bahador Bahmani**, *University of Tennessee, Knoxville, Tullahoma, TN, United States*, **Ming Yang**, **Anand Nagarajan**, *Ohio State University, Columbus, OH, United States*, **Philip L. Clarke**, *University of Tennessee, Knoxville, Tullahoma, TN, United States*, **Soheil Soghrati**, *Ohio State University, Dublin, OH, United States*, **Reza Abedi**, *University of Tennessee, Tullahoma, TN, United States***3:08pm – Utilizing Surface Displacement Fields From a Digital Image Correlation System and Inverse Algorithms to Map the Spatial Distribution of the Shear Modulus in 3D****Technical Presentation. IMECE2018-89889****Sevan Goenezen**, *Texas A&M University, College Station, TX, United States*, **Yue Mei**, *Swansea University, Swansea, United Kingdom*, **Ping Luo**, **Baik Jin Kim**, **Maulik Kotecha**, *Texas A&M University, College Station, TX, United States***12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS****12-26-4 Mechanics of Soft Materials and Soft Robots****Third Floor, David L. Lawrence Convention Center, Room 320
2:05pm–3:50pm****Session Chair:** Shaoxing Qu, *Zhejiang University, Hangzhou, Zhejiang, China***2:05pm – Programmable Multi-Functional Soft Robot Blends Into the Background****Technical Presentation. IMECE2018-89144****Zhanan Zou**, **Jianliang Xiao**, *University of Colorado Boulder, Boulder, CO, United States*, **Kai Yu**, *University of Colorado Denver, Denver, CO, United States***2:26pm – Mechanics-Guided Design of Active Material: Hard-Magnetic Soft Actuator****Technical Presentation. IMECE2018-89291****Ruike Zhao**, **Yoonho Kim**, *Massachusetts Institute of Technology, Cambridge, MA, United States*, **Shawn Chester**, *New Jersey Institute of Technology, North Caldwell, NJ, United States*, **Xuanhe Zhao**, *Massachusetts Institute of Technology, Cambridge, MA, United States*

2:47pm – Soft Electrically Actuated Actuators for Untethered Soft Robots

Technical Presentation. IMECE2018-89644

Xiaonan Huang, Kitty Kumar, Carnegie Mellon University, Pittsburgh, PA, United States, Mohammad Khalid Jawed, University of California, Los Angeles, Los Angeles, CA, United States, Amir M. Nasab, University of Nevada, Reno, Reno, NV, United States, Zisheng Ye, Carnegie Mellon University, Pittsburgh, PA, United States, Wanliang Shan, University of Nevada Reno, Reno, NV, United States, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States

3:08pm – A Soft Origami Robot Driven by Electrostatic Forces

Technical Presentation. IMECE2018-89905

Jisen Li, Hareesh Godaba, National University of Singapore, Singapore, Singapore, Zhiqian Zhang, Choon Chiang Foo, Institute of High Performance Computing, Singapore, Singapore, Jian Zhu, National University of Singapore, Singapore, Singapore

3:29pm – A Thermosensitive Chameleon Hydrogel Fabric With Fast Response, Good Reversibility and Adjustable Temperature Sensitivity

Technical Presentation. IMECE2018-89273

Tonghao Wu, Tenghao Yin, Zhejiang University, Hangzhou, Zhejiang, China

12-27 MULTIFUNCTIONAL AND MICRO-/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION

12-27-3 Multifunctional and Micro-/Nano-structured Materials: Modeling and Characterization (III)

Third Floor, David L. Lawrence Convention Center, Room 336
2:05pm–3:50pm

Session Chair: Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States

2:05pm – Pave the Path for New Architected Materials via Multi-Material 3D Printing

Technical Presentation. IMECE2018-90036

Yaning Li, University of New Hampshire, Durham, NH, United States

2:26pm – Two Extended Versions of Hill's Lemma Based on the Modified Couple Stress Theory

Technical Presentation. IMECE2018-88198

Ahmad Gad, Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States

2:47pm – Mechanically Mediated Asymmetric Thermal Transports in in-Plane Heterostructures

Technical Presentation. IMECE2018-89065

Yuan Gao, Baoxing Xu, University of Virginia, Charlottesville, VA, United States

3:08pm – Average Behavior of Nonlinear Magneto-Electro-Elastic Particulate Composites

Technical Presentation. IMECE2018-86970

You-shu Zhan, Chien-hong Lin, National Cheng Kung University, Tainan, Taiwan

3:29pm – A Microstructure-Based Modeling Approach for Electrostriction in Relaxor Ferroelectric Polymers

Technical Presentation. IMECE2018-89912

Anil Erol, Paris Von Lockette, Pennsylvania State University, University Park, PA, United States

12-30 SYMPOSIUM ON MULTIPHYSICS SIMULATIONS AND EXPERIMENTS FOR SOLIDS

12-30-1 Symposium on Multiphysics Simulations and Experiments for Solids

Third Floor, David L. Lawrence Convention Center, Room 335
2:05pm–3:50pm

Session Chair: Qian Qian, University of Texas at Dallas, Richardson, TX, United States

2:05pm – Multiscale, Data-Driven Process-Structure-Property Modeling for Additive Manufacturing in Metals: Part 1

Technical Presentation. IMECE2018-89263

Gregory Wagner, Zhengtao Gan, Yanping Lian, Wing Liu, Northwestern University, Evanston, IL, United States

2:26pm – Multiscale, Data-Driven Process-Structure-Property Modeling for Additive Manufacturing in Metals: Part 2

Technical Presentation. IMECE2018-89264

Gregory Wagner, Zhengtao Gan, Yanping Lian, Wing Liu, Northwestern University, Evanston, IL, United States

2:47pm – Influence of Lattice Mismatch and Nucleation Anisotropy on Inoculating Efficiency at Various Cooling Rates: Insights Into Grain Refinement of Additively Manufactured Metals

Technical Presentation. IMECE2018-89455

Zhuo Wang, Mississippi State University, Starkville, MS, United States, Yaohong Xiao, Mississippi State University, Mississippi State, MS, United States, Lei Chen, Mississippi State University, Starkville, MS, United States

3:08pm – Stress Corrosion Cracking Effects in a Rolled Homogeneous Armor Steel Alloy

Technical Presentation. IMECE2018-89636

Brian Sprow, Center for Advanced Vehicular Systems, Starkville, MS, United States, Luke Peterson, Mississippi State University, Starkville, MS, United States, Lydia Jordan, Center for Advanced Vehicular Systems, Starkville, MS, United States

3:29pm – A Multi-Temporal Scale Approach to Thermomechanical Fatigue Failure Prediction
Technical Presentation. IMECE2018-89262

Rui Zhang, *University of Texas at Dallas, Richardson, TX, United States*, **Lihua Wen**, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*, **Qian Qian**, *University of Texas at Dallas, Richardson, TX, United States*

12-41 DYNAMIC FAILURE OF MATERIALS AND STRUCTURES

12-41-2 Dynamic Failure of Materials and Structures
Third Floor, David L. Lawrence Convention Center, Room 321
2:05pm–3:50pm

Session Chair: L. Roy Xu, *University of New Mexico, Albuquerque, NM, United States*

2:05pm – Couple Diffusion-Thermo-Mechanical Model for Life Prediction of a Turbine Engine Blade

Technical Paper Publication. IMECE2018-88461
Samir Naboulsi, *AFRL - DSRC; Engility, Beavercreek, OH, United States*

2:26pm – Modeling of Dynamic Failure of Metals at the Atomic Scales and the Mesoscales

Technical Presentation. IMECE2018-88749
Avinash Dongare, *University of Connecticut, Storrs, CT, United States*

2:47pm – Modeling on Fracture of Core-Shell Structured Si Nanoparticles During Charging/Discharging Cycling

Technical Presentation. IMECE2018-89123
Xiang Gao, Jun Xu, Chunhao Yuan, *Beihang University, Beijing, China*

12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS

12-14-4 Experimental and Theoretical Models for Anisotropic Plasticity and Fracture
Fourth Floor, David L. Lawrence Convention Center, Room 402
4:00pm–5:45pm

Session Chair: Oana Cazacu, *University of Florida, Shalimar, FL, United States*

Session Co-Chair: H. Eliot Fang, *Sandia National Laboratories, Albuquerque, NM, United States*

4:00pm – Anisotropic Fracture Criterion for Metals
Invited Presentation. IMECE2018-88780

Jeong Whan Yoon, *KAIST, Daejeon, Korea (Republic)*

4:42pm – Theoretical and Numerical Formulation of an Efficient Anisotropic Distortional Hardening Model
Technical Presentation. IMECE2018-87968

Brian Lester, William Scherzinger, *Sandia National Laboratories, Albuquerque, NM, United States*

5:03pm – An Experimental Investigation on the Tensile Deformation and Diffuse Necking of an Anisotropic Bar
Technical Presentation. IMECE2018-87893

Wei Tong, Xu Nie, *Southern Methodist University, Dallas, TX, United States*, **Bo Song**, *Sandia National Laboratories, Albuquerque, NM, United States*

5:24pm – Prediction of Plastic Flow Localization With Shell Element in Thick AHSS Sheets

Technical Presentation. IMECE2018-86535
Minsu Wi, JaeHyun Choi, Frederic Barlat, *Postech, Pohang, Gyeongbuk, Korea (Republic)*

12-16 MULTISCALE MODELING AND EXPERIMENTATION OF GEOMATERIALS

12-16-2 Multiscale Modeling and Experimentation of Geomaterials

Third Floor, David L. Lawrence Convention Center, Room 333
4:00pm–5:45pm

Session Chair: William Lawrimore, *U.S. Army Engineer Research and Development Center, Vicksburg, MS, United States*

4:00pm – Failure Prediction Using Gibbs Formulation of Granular Micromechanics

Technical Presentation. IMECE2018-89206
Anil Misra, Rizacan Sarikaya, *University of Kansas, Lawrence, KS, United States*, **Payam Pooresolhjoui**, *Purdue University, West Lafayette, IN, United States*

4:21pm – New Penetration Models for Ballistic Clay Incorporating Strain Hardening, Rate Dependence and Temperature Effects

Technical Presentation. IMECE2018-89622
Yongqiang Li, Xin-Lin Gao, *Southern Methodist University, Dallas, TX, United States*, **Adam Fournier**, *Program Executive Office - Soldier, Fort Belvoir, VA, United States*, **Ricardo Vega**, *NCI Inc., Fort Belvoir, VA, United States*

4:42pm – Modeling of Ultra-High Performance Concrete Flyer Plate Experiments

Technical Presentation. IMECE2018-89898
Jesse Sherburn, William F. Heard, *U.S. Army Engineer Research and Development Center, Vicksburg, MS, United States*

5:03pm – Discrete Element Method Simulations of Fracture in Concrete

Technical Presentation. IMECE2018-89966
T.W. Stone, Tyrone McDonald, Bohumir Jelinek, *Mississippi State University, Starkville, MS, United States*

12-20 MULTISCALE MECHANICS OF DUCTILE FAILURE

12-20-2 Multiscale Mechanics of Ductile Failure

Third Floor, David L. Lawrence Convention Center, Room 334
4:00pm–5:45pm

Session Chair: Justin Wilkerson, *Texas A&M University, College Station, TX, United States*

4:00pm – Modeling the Nucleation, Growth and Coalescence Behavior of Voids During Spall Failure of Al Microstructures at Mesoscales Using Quasi-Coarse-Grained Dynamics (QCGD) Simulations

Technical Presentation. IMECE2018-89921

Garvit Agarwal, Avinash Dongare, University of Connecticut, Storrs, CT, United States

4:21pm – Dynamic Failure of Nanostructured Metals With Supersaturated Vacancies

Technical Presentation. IMECE2018-89901

Sara Adibi, Texas A&M University, Austin, TX, United States, Justin Wilkerson, Texas A&M University, College Station, TX, United States

4:42pm – Prediction of Strain Rate, Stress State, and Temperature Dependent Plasticity and Damage Evolution in an Aluminum 7085-T711 Alloy Using an Internal State Variable Based Constitutive Model

Technical Presentation. IMECE2018-89318

Luke Peterson, Mark Horstemeyer, Thomas E. Lacy, Mississippi State University, Starkville, MS, United States

5:03pm – Ductile Fracture of Multiphase Steel Sheets Under Bending

Technical Presentation. IMECE2018-89304

Yu Liu, Ankit Srivastava, Texas A&M University, College Station, TX, United States

5:24pm – Finite-Strain Homogenization Models for Viscoplastic Polycrystals Incorporating Void Growth and Texture Evolution

Technical Presentation. IMECE2018-89409

Shuvrangs Das, Dawei Song, Pedro Ponte Castañeda, University of Pennsylvania, Philadelphia, PA, United States

12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS

12-26-5 Mechanics of Soft Materials and Soft Robots

Third Floor, David L. Lawrence Convention Center, Room 320
4:00pm–5:45pm

Session Chair: Shaoxing Qu, *Zhejiang University, Hangzhou, Zhejiang, China*

4:00pm – Thin Film Electrostatic-Actuator-Based Soft Robots

Technical Presentation. IMECE2018-89353

Congran Jin, Dartmouth College, Hanover, NH, United States, Jinhua Zhang, Xi'an Jiaotong University, Xi'an, Shanxi, China, Shicheng Huang, Ian Trase, Zhe Xu, John X.J. Zhang, Zi Chen, Dartmouth College, Hanover, NH, United States

4:21pm – Shape Controllable Soft Bilayer Pneumatic Actuators

Technical Presentation. IMECE2018-89355

Yinding Chi, Temple University, Philadelphia, PA, United States, Jie Yin, Temple University, Haverford, PA, United States

4:42pm – Switchable Adhesion Actuator for Amphibious Climbing Soft Robot

Technical Presentation. IMECE2018-89443

Yichao Tang, Temple University, Philadelphia, PA, United States, Jie Yin, Temple University, Haverford, PA, United States

5:03pm – Hybrid Liquid Metal-Microelectronics Sensor Skin Integration for Soft Robots

Technical Presentation. IMECE2018-89643

Tess Hellebrekers, Kadri Bugra Ozutemiz, Jessica Yin, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States

5:24pm – Bioinspired Design of Thermally-Driven Vascular Artificial Muscle

Technical Presentation. IMECE2018-89147

Shengqiang Cai, University of California, San Diego, La Jolla, CA, United States

12-27 MULTIFUNCTIONAL AND MICRO-/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION

12-27-4 Multifunctional and Micro-/Nano-structured Materials: Modeling and Characterization (IV)

Third Floor, David L. Lawrence Convention Center, Room 331
4:00pm–5:45pm

Session Chair: Xin-Lin Gao, *Southern Methodist University, Dallas, TX, United States*

Session Co-Chair: Haifeng Zhao, *Chinese Academy of Sciences, Beijing, China*

4:00pm – Simulation of Mouse Brain Tissue Under Controlled Cortical Impact

Technical Paper Publication. IMECE2018-88790

Haifeng Zhao, *Chinese Academy of Sciences, Beijing, China*, **Changxin Lai**, *Shanghai Jiao Tong University, Shanghai, China*, **Ke Wang**, *Chinese Academy of Sciences, Beijing, China*, **Suhao Qiu**, *Shanghai Jiao Tong University, Shanghai, China*, **Tianyao Wang**, *The Fifth People's Hospital of Shanghai, Shanghai, China*, **Wenheng Jiang**, *Soochow University, Shanghai, China*, **Jun Liu**, *The Fifth People's Hospital of Shanghai, Fudan University, Shanghai, China*, **Xiangdong Li**, *First Affiliated Hospital of Soochow University, Shanghai, China*, **Jianfeng Zeng**, *Soochow University, Suzhou, China*, **Yuan Feng**, *Shanghai Jiao Tong University, Shanghai, China*

4:21pm – A Finite Element Approach for Study of Wave Attenuation Characteristics of Epoxy Polymer Composite

Technical Paper Publication. IMECE2018-87873

Shank S. Kulkarni, **Alireza Tabarraei**, **Pratik Ghag**, *University of North Carolina at Charlotte, Charlotte, NC, United States*

4:42pm – Dynamic Behavior of Cellular Graphene Aerogel

Technical Presentation. IMECE2018-89366

Zihao Yuan, **Haifeng Zhao**, *Chinese Academy of Sciences, Beijing, China*

5:03pm – Computational Modeling of Head Injuries Induced by Golf Ball Impacts

Technical Presentation. IMECE2018-87229

Yongqiang Li, **Xin-Lin Gao**, *Southern Methodist University, Dallas, TX, United States*

12-30 SYMPOSIUM ON MULTIPHYSICS SIMULATIONS AND EXPERIMENTS FOR SOLIDS

12-30-2 Symposium on Multiphysics Simulations and Experiments for Solids

Third Floor, David L. Lawrence Convention Center, Room 335
4:00pm–5:45pm

Session Chair: Rui Zhang, *University of Texas at Dallas, Richardson, TX, United States*

4:00pm – Modeling the Behavior of Heterogeneous Systems Subjected to the Coupled Effects of Electromagnetic and Mechanical Fields

Technical Presentation. IMECE2018-89566

Mohamed Elbadry, **Michael Steer**, **Mohammed Zikry**, *North Carolina State University, Raleigh, NC, United States*

4:21pm – Modeling Nano-Architected Electrodes With Elastic Instabilities: The Role of Buckling on Electrochemical Performance

Technical Presentation. IMECE2018-89238

Claudio Di Leo, **Arman Afshar**, *Georgia Institute of Technology, Atlanta, GA, United States*, **Xiaoxing Xia**, **Julia R. Greer**, *California Institute of Technology, Pasadena, CA, United States*

4:42pm – Heat Built Up During Dynamic Mechanical Analysis (DMA) Testing of Rubber Specimens

Technical Paper Publication. IMECE2018-88627

Roja Esmaeeli, *University of Akron, Akron, OH, United States*, **Ashkan Nazari**, *Virginia Tech, Blacksburg, VA, United States*, **Haniph Aliniagerdroudbari**, **Seyed Reza Hashemi**, *University of Akron, Akron, OH, United States*, **Muapper Alhadri**, **Waleed Zakri**, **Siamak Farhad**, *University of Akron, Akron, OH, United States*

5:03pm – Simulating Eddy Current Sensors in Blade Tip Timing Application: Modeling and Experimental Validation

Technical Paper Publication. IMECE2018-87414

Nidhal Jamia, **Michael I. Friswell**, *Swansea University, Bay Campus, Swansea, United Kingdom*, **Sami El-Borgi**, **Prakash Rajendran**, *Texas A&M University at Qatar, Doha, Qatar*

5:24pm – Mechanics of non-collagenous interfaces in bone

Technical Presentation. IMECE2018-89438

Yang Wang, **Seyedreza Mosali**, *University of Texas at Dallas, Richardson, TX, United States*, **Zhengwei Dai**, *Jiaying University, Jiaying, China*, **Majid Minary**, **Qian Qian**, *University of Texas at Dallas, Richardson, TX, United States*

12-32 HIGH-PERFORMANCE NANOSTRUCTURAL MATERIALS AND NANOCOMPOSITES

12-32-1 High-Performance Nanostructural Materials and Nanocomposites

Third Floor, David L. Lawrence Convention Center, Room 321
4:00pm–5:45pm

Session Chair: Yuris Dzenis, *University of Nebraska, Lincoln, NE, United States*

4:00pm – Effect of Graphene on Mechanical Performance of Pin-Loaded Circular Hole in Laminated Composites

Technical Paper Publication. IMECE2018-87566

Olanrewaju Aluko, *University of Michigan-Flint, Flint, MI, United States*

4:15pm – Atomistic Simulations of Mechanical Properties of Circular and Collapsed Carbon Nanotubes With Covalent Cross-Links

Technical Paper Publication. IMECE2018-88172

Alexey Volkov, Arun Thapa, *University of Alabama, Tuscaloosa, AL, United States*

4:30pm – Learning From Nature: Use Material Architecture to Break the Performance Trade-Offs in Bulk Materials

Technical Presentation. IMECE2018-89685

Zian Jia, *Stony Brook University, Setauket, NY, United States*,
Yang Yu, *Beijing Institute of Technology, Beijing, China*,
Shaoyu Hou, Lifeng Wang, *Stony Brook University, Stony Brook, NY, United States*

4:45pm – Effect of Crystallizability on Mechanical Properties of Continuous Polymer Nanofibers

Technical Presentation. IMECE2018-89829

Yan Zou, Dimitry Papkov, Yuris Dzenis, *University of Nebraska–Lincoln, Lincoln, NE, United States*

5:00pm – Ultrastrong/Tough Continuous Bionanofibers

Technical Presentation. IMECE2018-89847

Mohammad Andalib, Yuris Dzenis, *University of Nebraska–Lincoln, Lincoln, NE, United States*

5:15pm – Incorporating Electrospun Nanofibers Into Structural High-Temperature Nanocomposites

Technical Presentation. IMECE2018-89926

Taylor Stockdale, Dimitry Papkov, Mohammad N. Andalib, Yuris Dzenis, *University of Nebraska–Lincoln, Lincoln, NE, United States*

TRACK 13 MICRO- AND NANO-SYSTEMS ENGINEERING AND PACKAGING

13-1-1: General Topics of MEMS/NEMS

13-2-1: Micro- and Nano-Systems Engineering and Packaging Plenary I

13-2-2: Micro- and Nano-Systems Engineering and Packaging Plenary II

13-3-1: Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems I

12-3-2: Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems II

13-3-3: Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems III

13-4-1: Computational Studies on MEMS and Nanostructures I

13-4-2: Computational Studies on MEMS and Nanostructures II

13-6-1: Micro/Nano Materials and Devices

13-7-1: Applied Mechanics and Materials I

13-7-2: Applied Mechanics and Materials II

13-8-1: Electric Field Driven Microfluidics

13-8-2: Microfluidics in Bioengineering Applications

ACKNOWLEDGMENT

Track Organizers

Ioana Voiculescu, *City College of New York, United States*
Byoung Hee You, *Texas State University-San Marcos, United States*

Topic Organizers

Jong Hyun Choi, *Purdue University, United States*
Namwon Kim, *Texas State University, United States*
Aaron Mazzeo, *Rutgers, The State University of New Jersey, United States*
Po-hao Huang, *University of Arkansas, United States*
Mohammed Mayeed, *Kennesaw State University, United States*
Grzegorz (Greg) Hader, *U.S. Army RDECOM-ARDEC, United States*
Ibrahim Alhomoudi, *King Abdulaziz City for Science and Tech, Saudi Arabia*
Daniel Kaplan, *U.S. Army RDECOM-ARDEC, United States*

Jungkyu Park, *Kennesaw State University, United States*
Ayse Tekes, *Kennesaw State University, United States*
Sathish Kumar Gurupatham, *Kennesaw State University(formerly Southern Polytechnic State University), United States*
Tonfiz Mahmood, *Zodiac Aerospace, United States*
Wei Xue, *Rowan University, United States*
Byungki Kim, *University of Massachusetts, United States*
Seok Kim, *University of Illinois at Urbana-Champaign, United States*
Jeong Tae Ok, *Midwestern State University, United States*
Ahsan Mian, *Wright State University, United States*
Awlad Hossain, *Eastern Washington University, United States*
Hongwei Sun, *University of Massachusetts Lowell, United States*

Michael Schertzer, *Rochester Institute of Technology, United States*
Mohammad Hossan, *University of Central Oklahoma, United States*

Session Organizers

Namwon Kim, *Texas State University, United States*
Ke Du, *Rochester Institute of Technology, United States*
Mitsuaki Kato, *Toshiba Corporation, Japan*
Zahabul Islam, *Pennsylvania State University, United States*
Wenbin Yu, *Purdue University, United States*
Ryan Pocratsky, *Carnegie Mellon University, United States*
Nazmul Islam, *University of Texas Rio Grande Valley, United States*

TRACK 13 MICRO- AND NANO-SYSTEMS ENGINEERING AND PACKAGING

WEDNESDAY, NOVEMBER 14

13-2 PLENARY PRESENTATIONS IN MEMS/NEMS ENGINEERING AND PACKAGING

13-2-1 Micro- and Nano-Systems Engineering and Packaging Plenary I

Third Floor, David L. Lawrence Convention Center, Room 301
9:00am–9:45am

9:00am – The Role of Arrayed Sensor Systems-on-Chip in Next-Generation MEMS Inertial Sensing
Plenary Presentation. IMECE2018-90106

Gary Fedder, *Carnegie Mellon University, Pittsburgh, PA, United States*

13-3 DESIGN AND FABRICATION, ANALYSIS, PROCESSES, AND TECHNOLOGY FOR MICRO AND NANO DEVICES AND SYSTEMS

13-3-1 Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems I

Fourth Floor, David L. Lawrence Convention Center, Room 406
10:00am–11:45am

Session Chair: Po-hao Huang, *University of Arkansas, Fayetteville, AR, United States*

10:00am – Rapid Preparation of BiOCi/BiOI for Degradation of Tartrazine and Pharmaceuticals Under Simulated Solar and LED Visible Light Irradiation

Technical Paper Publication. IMECE2018-86913

Ukoha Emekwo, *Purdue Water Institute/Purdue University Northwest, Hammond, IN, United States*, A. G. Agwu Nnanna, *University of Texas of the Permian Basin, Odessa, TX, United States*, John D. Vargo, Nicholas Baumhover, *State Hygienic Laboratory at the University of Iowa, Coralville, IA, United States*

10:21am – Micro-Mechanical Punching by a Double-Sided Hot Embossing Process

Technical Presentation. IMECE2018-89096

Devanda Lek, Joseph Miller, In-Hyouk Song, *Texas State University, San Marcos, TX, United States*, Du Hwan Chun, *Yeungnam University, Gyongsan, Korea (Republic)*, Byoung Hee You, *Texas State University, San Marcos, TX, United States*

10:42am – Strain-Amplifying Cellular Microstructure for Flexible Piezo-Powered Actuator

Technical Presentation. IMECE2018-89556

E.J. Carron, R. Valery Roy, *University of Delaware, Newark, DE, United States*

11:03am – Fabrication of Hair-Like Surface Nanostructures on Elastomeric Films for Highly Sensitive Resistive Pressure sensors

Technical Presentation. IMECE2018-89934

Kwanoh Kim, Eunju Yeo, Minhee Son, Jae Sung Yoon, Yeong-Eun Yoo, Jeong Hwan Kim, Doo-Sun Choi, *Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

11:24am – Progress in Process Development of Tantalum Thin Film as a Micro-/Nanoscale Structural Material

Technical Presentation. IMECE2018-89952

Longchang Ni, Ryan Pocratsky, Maarten De Boer, *Carnegie Mellon University, Pittsburgh, PA, United States*

13-3 DESIGN AND FABRICATION, ANALYSIS, PROCESSES, AND TECHNOLOGY FOR MICRO AND NANO DEVICES AND SYSTEMS

13-3-2 Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems II

Fourth Floor, David L. Lawrence Convention Center, Room 406
1:45pm–3:30pm

Session Chair: Byoung Hee You, *Texas State University, San Marcos, TX, United States*

1:45pm – Methods of Mass-Flow Characterization of Water-Glycol Mixtures Through Micro-/Nano-Channels

Technical Paper Publication. IMECE2018-87928

John B. Lee, Po-hao Huang, *University of Arkansas, Fayetteville, AR, United States*

2:06pm – Design and Fabrication of a Microfluidic Module for Solid Phase Extraction of Nucleic Acids and Affinity Selection of Exosomes

Technical Presentation. IMECE2018-88293

Daniel Park, *Louisiana State University, Baton Rouge, LA, United States*, J.M. Jackson, C.D.M. Campos, S.A. Soper, *University of Kansas, Lawrence, KS, United States*, Michael Murphy, *Louisiana State University, Baton Rouge, LA, United States*

2:27pm – Fabrication of Optically Transparent, Superhydrophobic Films on Plastic Surfaces From Raspberry-Shaped Particles

Technical Presentation. IMECE2018-88462

Xiaoxiao Zhao, Daniel Park, Michael Murphy, *Louisiana State University, Baton Rouge, LA, United States*

2:48pm – Wormlike Micellar Solutions Passing Through a Sudden Contraction Microchannel

Technical Presentation. IMECE2018-89345

Emad Jafari Nodoushan, *Texas State University, San Marcos, TX, United States*, Taeil Yi, *Kyungnam University, Changwon, Gyeongsangnam-do, Korea (Republic)*, Young Ju Lee, Namwon Kim, *Texas State University, San Marcos, TX, United States*

3:09pm – Demonstrating the Potential of a Hybrid Model to Increase the 360 Degrees Rotational Motion Freedom of Ironless Permanent Magnet Planar Motors
Technical Paper Publication. IMECE2018-87007
Ding Yuan, Ming Zhang, Yu Zhu, Xin Li, Leijie Wang,
Tsinghua University, Beijing, China

13-4 COMPUTATIONAL STUDIES ON MEMS AND NANOSTRUCTURES

13-4-1 Computational Studies on MEMS and Nanostructures I

Fourth Floor, David L. Lawrence Convention Center, Room 406
3:45pm–5:30pm

Session Chair: Grzegorz (Greg) Hader, *U.S. Army RDECOM-ARDEC, Picatinny Arsenal, NJ, United States*

3:45pm – Effect of Polydispersity on the Morphology of P3HT:PCBM Organic Solar Cells by Coarse-Grained Molecular Simulations

Technical Presentation. IMECE2018-86439

Joydeep Munshi, *Lehigh University, Bethlehem, PA, United States*, **Wei Chen,** *Northwestern University, Evanston, IL, United States*, **TeYu Chien,** *University of Wyoming, Laramie, WY, United States*, **Ganesh Balasubramanian,** *Lehigh University, Bethlehem, PA, United States*

4:06pm – Electrostatic Doping Based Graphene Nanoribbon Tunneling Transistor: A Simulation Study
Technical Presentation. IMECE2018-86608

Weixiang Zhang, *University at Buffalo, State University of New York, Buffalo, NY, United States*, **Tarek Ragab,** *Arkansas State University, State University, AR, United States*, **Cemal Basaran,** *University at Buffalo, State University of New York, Buffalo, NY, United States*

4:27pm – Biomimetic Membrane Simulation for Water Desalination

Technical Paper Publication. IMECE2018-86664

Peter Oviroh, Rokhsareh Akbarzadeh, Tien-Chien Jen,
University of Johannesburg, Johannesburg, South Africa

4:48pm – Multiscale Modeling of PEEK Using Reactive Molecular Dynamics Modeling and Micromechanics
Technical Presentation. IMECE2018-88935

Will Pisani, Matthew Radue, *Michigan Technological University, Houghton, MI, United States*, **Sorayot Chinkanjanarot,** *National Metals and Materials Technology Center, Khlong Nueng, Pathum Thani, Thailand*, **Brett A. Bednarczyk, Evan Pineda,** *NASA Glenn Research Center, Cleveland, OH, United States*, **Kevin Waters, Ravindra Pandey, Julie King, Gregory Odegard,** *Michigan Technological University, Houghton, MI, United States*

THURSDAY, NOVEMBER 15

13-2 PLenary PRESENTATIONS IN MEMS/NEMS ENGINEERING AND PACKAGING

13-2-2 Micro- and Nano-Systems Engineering and Packaging Plenary II

Third Floor, David L. Lawrence Convention Center, Room 303
8:00am–8:45am

8:00am – 2D Materials, Flexible Electrodes and Surfaces Plenary Presentation. IMECE2018-90107

Eui-Hyeok Yang, *Stevens Institute of Technology, Hoboken, NJ, United States*

13-1 GENERAL TOPICS OF MEMS/NEMS

13-1-1 General Topics of MEMS/NEMS

Room 338 **8:55am–10:40am**

Session Chair: Jong Hyun Choi, *Purdue University, West Lafayette, IN, United States*

8:55am – Experimental and Thermal Investigation of Flow Behavior in Mini Channel Heat Sink

Technical Presentation. IMECE2018-88924

Harshit M. Trivedi, *ITM Universe, Vadodara, Gujarat, India*

9:16am – Preliminary Exploration of Cell-Based SAW Detection for Water Toxicity

Technical Paper Publication. IMECE2018-86436

Kun-Lin Lee, *City College of New York, New York, NY, United States*, **Fang Li,** *New York Institute of Technology, New York, NY, United States*, **Anis Nurashikin Nordin,** *International Islamic University Malaysia, Kuala Lumpur, Malaysia*, **Ioana Voiculescu,** *City College of New York, New York, NY, United States*

9:37am – Mechanical Properties of 3D Printed Metals

Technical Paper Publication. IMECE2018-86310

Seyed Allameh, *Northern Kentucky University, Newport, KY, United States*, **Bailey Leininger, Brianna Harbin,** *Northern Kentucky University, Highland Heights, KY, United States*

9:58am – Additively Manufactured Sensors and Heat Exchangers for Gas Flow Using Novel Binder Jet Processing

Technical Presentation. IMECE2018-89570

Xiaolu Huang, Truong Do, Tyler J. Bauder, Hawke Suen, Patrick Kwon, Junghoon Yeom, *Michigan State University, East Lansing, MI, United States*

13-4 COMPUTATIONAL STUDIES ON MEMS AND NANOSTRUCTURES

13-4-2 Computational Studies on MEMS and Nanostructures II

Fourth Floor, David L. Lawrence Convention Center, Room 401
10:50am–12:35pm

Session Chair: Grzegorz (Greg) Hader, *U.S. Army RDECOM-ARDEC, Picatinny Arsenal, NJ, United States*

10:50am – Micro-Cantilever Beam Battery for Measurement of Viscosity in Extremely Small Volumes of Fluid

Invited Presentation. IMECE2018-86522

Amin Changizi, *Intelliquip, Breinigsville, PA, United States*,
M. Amin Changizi, *Intelliquip, Bethlehem, PA, United States*,
Ion Stiharu, *Concordia University, Montreal, Canada*

11:32am – Simulation of Fluid Flow in a Microchannel at Low Reynolds Number Using Dissipative Particle Dynamics

Technical Paper Publication. IMECE2018-87622

Waqas Waheed, *Khalifa University, Abu Dhabi, United Arab Emir.*, **Anas Alazzam**, *Khalifa University of Science, Technology & Research, Abu Dhabi, United Arab Emir.*, **Ashraf Al-Khateeb**, **Eiyad Abu-Nada**, *Khalifa University, Abu Dhabi, United Arab Emir.*

11:53am – Capillary-Controlled Thermal Diode in Heterogeneous Nanoporous Structures

Technical Presentation. IMECE2018-89713

Tadeh Avanessian, **Gisuk Hwang**, **Evan Boutz**, *Wichita State University, Wichita, KS, United States*

13-6 MICRO AND NANO DEVICES

13-6-1 Micro/Nano Materials and Devices

Third Floor, David L. Lawrence Convention Center, Room 338
10:50am–12:35pm

Session Chair: Ke Du, *Rochester Institute of Technology, Rochester, NY, United States*

10:50am – The Relationship Between Young's Modulus and the Dry Etching Rate of Polydimethylsiloxane (PDMS)

Technical Presentation. IMECE2018-89760

Matthew Fitzgerald, **Sara Tsai**, **Yang Zhao**, **Deyu Li**, *Vanderbilt University, Nashville, TN, United States*

11:11am – A Scalable Microfluidic Device for Switching of Microparticles Using Dielectrophoresis

Technical Paper Publication. IMECE2018-87664

Waqas Waheed, *Khalifa University, Abu Dhabi, United Arab Emir.*, **Anas Alazzam**, *Khalifa University of Science, Technology & Research, Abu Dhabi, United Arab Emir.*, **Bobby Mathew**, *UAE University, Al Ain, Abu Dhabi, United Arab Emir.*, **Eiyad Abu-Nada**, **Ashraf Al-Khateeb**, *Khalifa University, Abu Dhabi, United Arab Emir.*

11:32am – Photosensitivity of Monolayer Graphene-Based Field Effect Transistor

Technical Paper Publication. IMECE2018-87245

Jowes H. Goundar, *Tohoku University, Sendai, Japan*,
Ken Suzuki, **Hideo Miura**, *Tohoku University, Sendai, Miyagi, Japan*

11:53am – Atomically-Precise Graphene Etch Masks for 3D Integrated Systems From 2D Material Heterostructures

Technical Presentation. IMECE2018-87721

Jangyup Son, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Junyoung Kwon**, *Yonsei University, Seoul, Korea (Republic)*, **SunPhil Kim**, **Yinchun Lv**, **Jaehyung Yu**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Jong-Young Lee**, **Huije Ryu**, *Yonsei University, Seoul, Korea (Republic)*, **Kenji Watanabe**, **Takashi Taniguchi**, *National Institute for Materials Science, Namiki, Japan*, **Rita Garrido-Menacho**, **Nadya Mason**, **Elif Ertekin**, **Pinshane Huang**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Gwan-Hyoung Lee**, *Yonsei University, Seoul, Korea (Republic)*, **Arend van der Zande**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

13-7 APPLIED MECHANICS AND MATERIALS IN MICRO- AND NANO-SYSTEMS

13-7-1 Applied Mechanics and Materials I

Third Floor, David L. Lawrence Convention Center, Room 338
2:05pm–3:50pm

Session Chair: Mitsuaki Kato, *Toshiba Corporation, Kawasaki-Shi, Japan*

Session Co-Chair: Zahabul Islam, *Pennsylvania State University, State College, PA, United States*

2:05pm – Investigation of Moisture Damage Behavior of Warm-Mix Asphalt (WMA) With Chemical WMA Additives Towards Repeated Load-Deformation Analysis

Technical Paper Publication. IMECE2018-86273

Biswajit Bairgi, **Rafiqul A. Tarefder**, *University of New Mexico, Albuquerque, NM, United States*

2:26pm – Strain Induced Grain Growth and Low Temperature Annealing of Palladium Thin Film

Technical Presentation. IMECE2018-86352

Zahabul Islam, *Pennsylvania State University, State College, PA, United States*, **Md. Haque**, *Pennsylvania State University, University Park, PA, United States*

2:47pm – Evaluation Method for Performance of SiC Power Module by Electro-Thermal-Anisotropic Stress Coupled Analysis

Technical Paper Publication. IMECE2018-86626

Mitsuaki Kato, **Akihiro Goryu**, **Akira Kano**, **Kazuto Takao**, **Kenji Hirohata**, *Toshiba Corporation, Kawasaki, Japan*, **Satoshi Izumi**, *University of Tokyo, Bunkyo-ku, Japan*

3:08pm – Levy's Solution for Strain Gradient Plates Under Transverse Loading: Nonlocal Boundary Value Problems
Technical Presentation. IMECE2018-89427
Bishweshwar Babu, B.P. Patel, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*

3:29pm – Natural Fibrous Catcher of Liquid
Technical Presentation. IMECE2018-89514
Moxiao Li, Tianjian Lu, *Xi'an Jiaotong University, Xi'an, China, Feng Xu, Xi'an Jiaotong University/China, Shaanxi, China*

13-8 MICROFLUIDICS IN MICRO- AND NANOSYSTEMS

13-8-1 Electric Field Driven Microfluidics
Fourth Floor, David L. Lawrence Convention Center, Room 405
2:05pm–3:50pm

Session Chair: Nazmul Islam, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

2:05pm – Viscoelectric Effect on the Electroosmotic Flow in Nanochannels With Heterogeneous Zeta Potentials
Technical Paper Publication. IMECE2018-86384
Edson M. Jimenez, *Universidad Nacional Autónoma de Mexico, Ciudad de Mexico, Mexico, Juan P. Escandon, Instituto Politecnico Nacional, SEPI-ESIME Unidad Azcapotzalco, Ciudad de Mexico, Mexico, Federico Mèndez, Universidad Nacional Autónoma de Mexico, Ciudad de Mexico, Mexico*

2:26pm – Improving the Micropump Velocity for Orthogonal Electrode Pattern
Technical Paper Publication. IMECE2018-88629
Nazmul Islam, Rakesh Guduru, Chu-Wen Cheng, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

2:47pm – Knudsen Pump Powered Micro-Hovercrafts
Technical Presentation. IMECE2018-89552
John Cortes, Christopher Stanczak, Igor Bargatin, *University of Pennsylvania, Philadelphia, PA, United States*

3:08pm – Analysis of AC Electrokinetic Flow With Multiple Electrodes by Direct Measurement of Velocity Fields
Technical Presentation. IMECE2018-89803
Tharun Srinivas Karnam Reddy, Choongbae Park, *Texas A&M University–Kingsville, Kingsville, TX, United States*

3:29pm – Magnetic Antibody Functionalized Carbon Nanotube Ink for Rapid Printing of Biosensors
Technical Presentation. IMECE2018-89666
Sarah Mishriki, Abdel Rahman Abdel Fattah, Ahmed M. Abdalla, Elvira Meleca, Fei Geng, Suvojit Ghosh, Ishwar K. Puri, *McMaster University, Hamilton, ON, Canada*

13-3 DESIGN AND FABRICATION, ANALYSIS, PROCESSES, AND TECHNOLOGY FOR MICRO AND NANO DEVICES AND SYSTEMS

13-3-3 Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems III
Third Floor, David L. Lawrence Convention Center, Room 338
4:00pm–5:45pm

Session Chair: Namwon Kim, *Texas State University, San Marcos, TX, United States*

4:00pm – Design and Analysis of Electrostatically Actuated Mechanical Sensor for Graphene
Technical Paper Publication. IMECE2018-86407
Ayse Tekes, Jungkyu Park, *Kennesaw State University, Marietta, GA, United States*

4:21pm – Mechanical, Electrical and Electro-Mechanical Properties of CNTs/Carbon Black/ SEBS-Based TPE Nanocomposites for Large Deformation Sensor Applications
Technical Presentation. IMECE2018-86460
Xudong Yang, Lingyu Sun, Cheng Zhang, Bincheng Huang, *Beihang University, Beijing, China*

4:42pm – 3D Numerical Model for Prediction of Percolation Threshold and Piezoresistive Characteristics of Conductive Polymer Filled With CNT
Technical Paper Publication. IMECE2018-86528
Jun Han, Lingyu Sun, Lijun Li, *Beihang University, Beijing, China, Taikun Wang, Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering, Zhengzhou, China, Bincheng Huang, Xudong Yang, Beihang University, Beijing, China*

5:03pm – Area-Arrayed Graphene Nano-Ribbon-Base Strain Sensor
Technical Paper Publication. IMECE2018-87277
Ryohei Nakagawa, Zhi Wang, Ken Suzuki, *Tohoku University, Sendai, Miyagi, Japan*

5:24pm – Theoretical Study of Electronic Band Structure of Dumbbell-Shape Graphene Nanoribbons for Highly-Sensitive Strain Sensors
Technical Paper Publication. IMECE2018-88431
Qinqiang Zhang, Takuya Kudo, Ken Suzuki, *Tohoku University, Sendai, Miyagi, Japan*

13-7 APPLIED MECHANICS AND MATERIALS IN MICRO- AND NANO-SYSTEMS

13-7-2 Applied Mechanics and Materials II

Fourth Floor, David L. Lawrence Convention Center, Room 405
4:00pm–5:45pm

Session Chair: Wenbin Yu, *Purdue University, West Lafayette, IN, United States*

Session Co-Chair: Ryan Pocratsky, *Carnegie Mellon University, Pittsburgh, PA, United States*

4:00pm – Development of a Flexible Tactile Sensor Using Area-Arrayed Bundle Structures of Multi-Walled Carbon Nanotubes

Technical Paper Publication. IMECE2018-87275
Ryusaku Osada, Ken Suzuki, *Tohoku University, Sendai, Miyagi, Japan*

4:21pm – Negative Poisson’s Ratio in Two-Dimensional Honeycomb Structures

Technical Presentation. IMECE2018-89006
Guangzhao Qin, *University of South Carolina, Columbia, SC, United States*, **Zhenzhen Qin,** *Zhengzhou University, Zhengzhou, Henan, China*

4:42pm – Multiscale Analysis of Multilayer Printed Circuit Board Using Mechanics of Structure Genome

Technical Presentation. IMECE2018-89326
Fei Tao, Wenbin Yu, *Purdue University, West Lafayette, IN, United States*

5:03pm – A Test Chamber for Characterizing the Thermo-Mechanical Properties of Thin Films Under Harsh Conditions

Technical Presentation. IMECE2018-89764
Ryan Pocratsky, Longchang Ni, Prince Singh, Maarten De Boer, *Carnegie Mellon University, Pittsburgh, PA, United States*

13-8 MICROFLUIDICS IN MICRO- AND NANOSYSTEMS

13-8-2 Microfluidics in Bioengineering Applications

Third Floor, David L. Lawrence Convention Center, Room 336
4:00pm–5:45pm

Session Chair: Mohammad Hossan, *University of Central Oklahoma, Edmond, OK, United States*

4:00pm – Capillary Force Driven Single-Cell Spiking Apparatus for Studying Circulating Tumor Cells

Technical Paper Publication. IMECE2018-87109
Jacob Amontree, Kangfu Chen, Jose Varillas, Z. Hugh Fan, *University of Florida, Gainesville, FL, United States*

4:21pm – The Development and Characterization of a “Store and Create” Microfluidic Device to Study Ice Nucleation Particles

Technical Presentation. IMECE2018-89479
Thomas Brubaker, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Michael Polen,** *McDaniel College, Pittsburgh, PA, United States*, **Leif Jahn, Perry Cheng, Vinay Ekambaram, Shelley Anna, Ryan Sullivan,** *Carnegie Mellon University, Pittsburgh, PA, United States*

4:42pm – Deformable Shallow Microfluidics: Physics of the Fluid Flow and Novel Particle Manipulation Platform for Filtration, Isolation, and Controlled Release

Technical Presentation. IMECE2018-89655
Aryan Mehboudi, Junghoon Yeom, *Michigan State University, East Lansing, MI, United States*

5:03pm – A Novel Microfluidic Device for High-Throughput Immobilization and Mechanostimulation of Small Multicellular Organisms

Technical Presentation. IMECE2018-89718
Utku Sonmez, Ardon Z. Shorr, John S. Minden, Philip R. LeDuc, *Carnegie Mellon University, Pittsburgh, PA, United States*

5:24pm – The Effect of Electric Field on Cell Functions During DC Dielectrophoretic Cell Manipulation

Technical Presentation. IMECE2018-86949
Mohammad Hossan, Nicholas Walker, Melville Vaughan, Amalie L. Moyna, *University of Central Oklahoma, Edmond, OK, United States*

**TRACK 14 ASME INTERNATIONAL UNDERGRADUATE RESEARCH
AND DESIGN EXPO (POSTERS ONLY)**

ACKNOWLEDGMENT

Track Organizers

Zahra Sotoudeh, *Cal Poly Pomona, United States*
Eleonora Tubaldi, *University of Arizona, United States*

Topic Organizer

Eleonora Tubaldi, *University of Arizona, United States*

TRACK 14 ASME INTERNATIONAL UNDERGRADUATE RESEARCH AND DESIGN EXPO (POSTERS ONLY)

SUNDAY, NOVEMBER 11

14-1 GENERAL

14-1-1

Exhibit Hall B

5:30pm–7:00pm

1. Effects of Forced Upstream Flow Fluctuations on Vortex Shedding Intensity in a Normal Triangular Tube Array

Undergrad Expo. IMECE2018-88557

Kazybek Kassym, Aida Iskaliyeva, Luis Rojas-Solorzano, Nazarbayev University, Astana, Astana, Kazakhstan

2. Design, Analysis and Realization of a Novel Compliant Bistable Mechanism

Undergrad Expo. IMECE2018-88896

Hongkuan Lin, Niko Giannakakos, Ayse Tekes, Kennesaw State University, Marietta, GA, United States

3. Take Home Lab Equipment Design to Study Free Response of Single DOF and 2 DOF Vibratory Mechanisms

Undergrad Expo. IMECE2018-88906

Zach Marr, Michael Weitzel, Ayse Tekes, Julia Ortiz, Kennesaw State University, Marietta, GA, United States

4. Design and Analysis of a Novel Semi Compliant Swashplate Mechanism

Undergrad Expo. IMECE2018-88927

Niko Giannakakos, Ayse Tekes, Adeel Khalid, Kennesaw State University, Marietta, GA, United States

5. Design, Analysis, Modeling and Experimental Validation of Compliant Five Bar Mechanism

Undergrad Expo. IMECE2018-89085

Michael Weitzel, Ayse Tekes, Kennesaw State University, Marietta, GA, United States

6. Design and Experimental Validation of a Large Displacement Compliant Folded Beam Mechanism

Undergrad Expo. IMECE2018-89150

Hunter Horner, Sergio Canchola, Cody Delarosa, Ayse Tekes, Kennesaw State University, Marietta, GA, United States

7. Engineering Graphene-Based Membranes for Electromechanical Sensors

Undergrad Expo. IMECE2018-89195

Owen D. Pearl, Adam N. Brock, Quang N. Tran, Gordon B. Walbert, Owen D. Papa, Dmitriy A. Dikin, Temple University, Philadelphia, PA, United States

8. Effect of Microfluidic Boundary Conditions on Flow Topology Optimization

Undergrad Expo. IMECE2018-89434

Gabriel Garneau, Matthew Owen, Georg Pinggen, Union University, Jackson, TN, United States, Kurt Maute, University of Colorado Boulder, Boulder, CO, United States

9. Flow Over a Smooth Sphere, Sphere With Dimples and Sphere With Double Dimples

Undergrad Expo. IMECE2018-89440

Andreina De La Cruz, Kinnari Shah, LaGuardia Community College-CUNY, Long Island City, NY, United States

10. Design of a 3D Printed Modular Robot

Undergrad Expo. IMECE2018-89445

Mark Bedillion, Carnegie Mellon University, Gibsonia, PA, United States, Xuan Chen, Jason Liu, Carnegie Mellon University, Pittsburgh, PA, United States

11. Developing Methods for Measuring Thermal Properties of Polyimide Substrates

Undergrad Expo. IMECE2018-89472

Carlos Vargas Venegas, Pennsylvania State University, State College, PA, United States, Shawn Siroka, Pennsylvania State University, West Hazleton, PA, United States, Reid A.

Berdanier, Pennsylvania State University, State College, PA, United States

12. Using Surface Wave Elastography to Investigate Achilles Tendon Stiffness

Undergrad Expo. IMECE2018-89536

Alan Palmer, Kennesaw State University, Canton, GA, United States

13. Design and Fabrication of a UAV Protection System

Undergrad Expo. IMECE2018-89577

Renato Rodriguez, Joseph Franke, Sijan Shrestha, Anthony Nguyen, Matthew Bishop, Robert Gallo, Damoon Soudbakhsh, George Mason University, Fairfax, VA, United States

14. High Temperature Digital Image Correlation for Propulsion Materials Testing

Undergrad Expo. IMECE2018-89593

John Kershner, Natasha Bradley, Michael Walock, Anindya Ghoshal, Muthuvel Murugan, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States

15. Three-Dimensional Voxel-Based Finite Element Analysis of Dental Implants

Undergrad Expo. IMECE2018-89620

Kayla Reigh, Kangning Su, Pennsylvania State University, State College, PA, United States, Qiyuan Mao, Changzhou Institute of Light Industry, Changzhou, China, Mehran H. Zadeh, Temple University, Philadelphia, PA, United States, Greg Lewis, Pennsylvania State College of Medicine and M.S. Hershey Medical Center, Hershey, PA, United States, Jing Du, Pennsylvania State University, State College, PA, United States

16. Sponge Material Made of Reduced Graphene Oxide: Synthesis and Properties

Undergrad Expo. IMECE2018-89637

Gordon B. Walbert, Adam N. Brock, Owen Pearl, Owen D. Papa, Quang N. Tran, Dmitriy A. Dikin, Temple University, Philadelphia, PA, United States

17. Techno-Economic Analysis of MSW Bioenergy

Undergrad Expo. IMECE2018-89717

Miranda Noack, *St. Ambrose University, Davenport, IA, United States*

18. Numerical Insights of Fluid-Thermal Characteristics in a Hybrid Microjet Liquid-Cooled Heat Sink

Undergrad Expo. IMECE2018-89720

Shitiz Sehgal, Matthew Schultz, Bladimir Ramos, *Pennsylvania State University, University Park, PA, United States*

19. Laser-Induced Graphene Supercapacitors

Undergrad Expo. IMECE2018-89734

Robert Sitbon, *Queensborough Community College, Westwood, NJ, United States*, **Alex Sullivan**, *Queensborough Community College, Little Neck, NY, United States*, **Tricia Marchese**, *Queensborough Community College, Oakland Gardens, NY, United States*

20. Thermal Properties of a Concrete Aerogel Paste Composite

Undergrad Expo. IMECE2018-89775

Chris Kobus, *Oakland University, Rochester, MI, United States*

21. Powering Small Satellites and Robots Using External Laser Beams

Undergrad Expo. IMECE2018-89843

Carter Hoffman, *University of Arizona, Phoenix, AZ, United States*, **Jekan Thanga**, *University of Arizona, Tucson, AZ, United States*

22. Dynamics of Mechanical Power Amplification Systems in Invertebrates

Undergrad Expo. IMECE2018-89849

Jennifer Beahan, *SUNY New Paltz, New Paltz, NY, United States*

23. Highly Sensitive, Wireless Gas Sensing Based on 3D Nonporous Graphene and RFID

Undergrad Expo. IMECE2018-89860

Farbod Moghaddam, *George Mason University, Fairfax, VA, United States*, **Daniel Mitchell**, *George Mason University, Chantilly, VA, United States*, **Pilgyu Kang**, *George Mason University, Fairfax, VA, United States*, **Byoung Gok Kim**, **Minsu Kim**, *Korea Research Institute of Chemical Technology, Yuseong-gu, Daejeon, Korea (Republic)*

24. Mechanical Optimization of Composite Coatings Deposited by Self-Limiting Electrospray Deposition

Undergrad Expo. IMECE2018-89899

Christianna Kuznetsova, Lin Lei, Daehoon Han, Howon Lee, Jonathan Singer, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

25. Energy Absorption Analysis of Additively Manufactured Lattice Mechanical Metamaterials

Undergrad Expo. IMECE2018-89930

John Recktenwald, *George Mason University, Roanoke, VA, United States*, **Ali Beheshti**, *George Mason University, Fairfax, VA, United States*

26. Thermal Characterization of GaN-based Electronics and Optoelectronics

Undergrad Expo. IMECE2018-90001

Yiwen Song, *Pennsylvania State University, University Park, PA, United States*, **Tae Kyoung Kim, Moon Uk Cho, Jae Min Lee, Joon Seop Kwak**, *Sunchon National University, Suncheon, Jeonnam, Korea (Republic)*, **Sukwon Choi**, *Pennsylvania State University, University Park, PA, United States*

27. A Propulsion System for the Asteroid Mobile Imager and Geologic Observer (AMIGO)

Undergrad Expo. IMECE2018-90004

Gregory Wilburn, Jekan Thanga, *University of Arizona, Tucson, AZ, United States*

28. Design and Implementation of Real Time Water Monitoring System

Undergrad Expo. IMECE2018-90007

H.H. Sait, Khalid AlJudaybi, Abdullah Alkirithi, Mohammed Albarakati, Faiz Khadra, *King Abdulaziz University, Rabigh, Makkah, Saudi Arabia*

29. Using Time Domain Indentation Data to Characterize the Poroelasticity of Gels in Frequency Domain

Undergrad Expo. IMECE2018-90008

Alvin Maningding, Mojtaba Azadi, *San Francisco State University, San Francisco, CA, United States*

30. Leidenfrost Phenomenon

Undergrad Expo. IMECE2018-90011

Nazanin Farokhnia, *University of Houston, New York, NY, United States*, **Nazanin Farokhnia**, *NanoTherm Research Group, University of Houston, Houston, TX, United States*

31. Uterus Material Properties Explored via Atomic Force Microscopy

Undergrad Expo. IMECE2018-90012

Jose Rivera, Alvin Maningding, Victor Emmanuel, *San Francisco State University, San Francisco, CA, United States*, **Paolo Rinaudo**, *University of California at San Francisco, San Francisco, CA, United States*, **Mojtaba Azadi**, *San Francisco State University, San Francisco, CA, United States*

32. A Comparative Investigation of Sintering Methods for Polymer 3D Printing Using Selective Separation Shaping (SSS)

Undergrad Expo. IMECE2018-90022

Hadis Nouri, *University of Southern California, Los Angeles, CA, United States*

33. Thermal Properties and Microstructure Investigation of Natural Particulate Blended High Density Polyethylene composite

Undergrad Expo. IMECE2018-90024

Balaji Ayyanar Chinnappan, *Coimbatore Institute of Technology, Coimbatore, India*

34. The Effect of Multi-Walled Carbon Nanotube Additives Into Diesel-Camphor Biofuel Blend on Diesel Engine Performance, Combustion and Emission

Undergrad Expo. IMECE2018-90030

Rahul Kumar Tiwari, *Hyundai, Chennai, Tamil Nadu, India*,
Sanat Kumar, *Texas A&M University, College Station, TX, United States*

35. Self Powered Orthosis For Stroke Patient

Undergrad Expo. IMECE2018-90031

Rahul Kumar Tiwari, *Hyundai, Chennai, Tamil Nadu, India*,
Sanat Kumar, *Texas A&M University, College Station, TX, United States*

36. Performance and Surface Integrity of Wire Electrical Discharge Machining of Thin Ti6Al4V Plate Using Coated and Uncoated Wires

Undergrad Expo. IMECE2018-90034

Luca Watanabe Reolon, Carlos Augusto Laurindo, Ricardo Diego Torres, Fred Lacerda Amorim, *Pontificia Universidade Catolica do Parana, Curitiba, PR, Brazil*

37. Pave the Path for New Architected Materials via Multi-Material 3D Printing

Undergrad Expo. IMECE2018-90035

Yaning Li, *University of New Hampshire, Durham, NH, United States*

38. An Inflatable Aircraft for Mars Exploration

Undergrad Expo. IMECE2018-90042

Andrew Okonya, Aman Chandra, Jekan Thanga, *University of Arizona, Tucson, AZ, United States*

39. Robotic Construction on the Moon and Mars Using Selective Melting and Sintering

Undergrad Expo. IMECE2018-90043

Andrew Okonya, Erik Jensen, Aman Chandra, Jekan Thanga, *University of Arizona, Tucson, AZ, United States*

40. Fatigue Life Assessment of Dissimilar Aluminum Alloys Weld Joints Under Four Point Rotating Bending Condition

Undergrad Expo. IMECE2018-90049

Muhammad Hashir, Riffat Asim Pasha, *University of Engineering and Technology Taxila, Taxila Rawalpindi, Punjab, Pakistan*

41. Microstructure-Based Material Sensitive Design Framework

Undergrad Expo. IMECE2018-90050

Bryan Melara, Yan Li, Marcos Rodriguez, Anh Phung, Jun Cao, *California State University, Long Beach, Long Beach, CA, United States*

42. Investigation of Thermocapillary-Induced Deposited Shape in Fused-Coating Additive Manufacturing Process of Aluminum Alloy

Undergrad Expo. IMECE2018-90060

Jun Du, Zhengying Wei, *Xi'an Jiaotong University, Xi'an, China*

43. Optimization of Process Parameters and Sectional Shape of Samples in Single-Layer Single-Pass Sn63Pb37 Fused Coating Additive Manufacturing

Undergrad Expo. IMECE2018-90061

Jun Du, Zhengying Wei, *Xi'an Jiaotong University, Xi'an, China*

44. Preliminary System Development and Experimental Study of a Robotic Composite Prepreg Layup Process

Undergrad Expo. IMECE2018-90071

Vincent Legnetto, Andrew Wichelns, Yu Zhou, *SUNY Polytechnic Institute, Utica, NY, United States*

45. Numerical Simulation of Visco-Plastic Fluid Flow Between Two Parallel Plates With Triangular Obstacles

Undergrad Expo. IMECE2018-90074

Nariman Ashrafi, *IAU, Tehran, Iran*

46. Computational Design of a Bird-Inspired Perching Landing Gear Mechanism

Undergrad Expo. IMECE2018-90081

Paul Nadan, Christopher Lee, *Franklin W. Olin College of Engineering, Needham, MA, United States*

47. Defect Structure Induced Strength and Toughness Anisotropy in Hexagonal Boron Nitride (hBN)

Undergrad Expo. IMECE2018-90085

Allison Procak, *University of Delaware, Newark, DE, United States*

48. Material Testing of Skeletal Muscle Under Simple Shear

Undergrad Expo. IMECE2018-90086

Joelle Andres-Beck, *Bucknell University, Merlin, OR, United States*

49. Investigating a Framework for Visualizing Reinforcement Learning Algorithms via Quadrupedal Robotic Simulation

Undergrad Expo. IMECE2018-90087

Brendan Bogar, Paul Reverdy, *University of Arizona, Tucson, AZ, United States*

50. Assessment of Ultrasonic Vibration Assisted Grinding of CSiC Composites

Undergrad Expo. IMECE2018-90077

Yan Wang, Jingnan Zhao, Yinghuai Dong, Chang Shi, *Tianjin University of Science and Technology, Tianjin, China*

51. Hole Shielding: An FEA Study in Optimizing Stress Reduction Around a Hole

Undergrad Expo. IMECE2018-90078

Russell Oehlert, *Leidos, Oaks, PA, United States*, Austin C. Prete, *University of Maryland, New Market, MD, United States*, Daniel Longenecker, *Honda R&D, Dublin, OH, United States*, Stephen Kuchnicki, *York College of Pennsylvania, York, PA, United States*

52. An Object-Oriented Framework for Fast Development and Testing of Mobile Robot Control Algorithms

Undergrad Expo. IMECE2018-90080

David Chan, Paul Reverdy, Minh Nguyen, Oshadha Gunasekara, Randall Kliman, *University of Arizona, T*

53. Advanced Methods in Computational Mechanics Modelling Using Learning Algorithms and Decision Support Systems

Undergrad Expo. IMECE2018-90068
Kingsley Abhulimen, *University of Lagos, Lagos, Nigeria*

54. A Model for Gas-Liquid Slug Flow in a Horizontal Duct

Undergrad Expo. IMECE2018-90075
Nariman Ashrafi, *IAU, Tehran, Iran*

55. Energy Audit in Mechanical Department

Undergrad Expo. IMECE2018-90076
K.S. Venkatesh, *Mar Baselios College of Engineering and Technology, Trivandrum, Kerala, India*, Ashhad Noushad, *College, Kollam, Kerala, India*, Arjun Rakesh, Aswin S., Gokul S. Jain, *Mar Baselios College of Engineering and Technology, Trivandrum Kerala, Kerala, India*

56. CFD Simulation of Structure of Small Scale Prototype Solar Chimney Power Plant

Undergrad Expo. IMECE2018-90079
Premendra Bansod, *G.H. Rasoni College of Engineering & Management Wagholi Pune, Pune, Maharashtra, India*

57. Developing a Quantitate Tester That Detects Human Skin Property in Microscale on Live Human

Undergrad Expo. IMECE2018-90088
Ed Mo, Miguel Coto, Alvin Maningding, Mojtaba Azadi, *San Francisco State University, San Francisco, CA, United States*

58. Finite Element Modeling of NPS Knee Morphology

Undergrad Expo. IMECE2018-90089
Margo E. Yancey, *Bucknell University, Lewisburg, PA, United States*, Mark A. Seeley, *Geisinger Health Systems, Danville, PA, United States*, Benjamin B. Wheatley, *Bucknell University, Lewisburg, PA, United States*

59. Implementation of a Screw-Drive Extruder in a Desktop 3D-Printing System

Undergrad Expo. IMECE2018-90110
Hongyu Wang, Yujing Zhou, *Bucknell University, Lewisburg, PA, United States*

60. Inhomogeneous Composition Fields in SiGe/Si(001) Quantum Dots

Undergrad Expo. IMECE2018-90111
Shawn Egan, Jinye Liu, Md Hossain, *University of Delaware, Newark, DE, United States*

61. Thermomechanical Stability of Alloy Quantum Dots on Thin-Films

Undergrad Expo. IMECE2018-90112
Tianyi Weng, Md Hossain, *University of Delaware, Newark, DE, United States*

62. Controlling Effective Mechanical Properties of Nanocomposites via Atomic Stitching

Undergrad Expo. IMECE2018-90114
Colin McDermitt, Md Hossain, *University of Delaware, Newark, DE, United States*

63. Laser Assisted Ultrasonic Nanocrystal Surface Modification of AISI 4140 Steel

Undergrad Expo. IMECE2018-90115
Eman Hassan, Jun Liu, Chang Ye, Yalin Dong, *University of Akron, Akron, OH, United States*

64. Three-Dimensional Full-Field Strain Mapping in Total Shoulder Replacement

Undergrad Expo. IMECE2018-90116
Yuxiao Zhou, Chujie Gong, *Penn State University, State College, PA, United States*, Greg Lewis, *Penn State College of Medicine and M.S. Hershey Medical Center, Hershey, PA, United States*, April Armstrong, *Penn State Hershey Bone and Joint Institute, Hershey, PA, United States*, Jing Du, *Penn State University, State College, PA, United States*

65. Blueprint 3D: A Collapsible and Portable 3D Printer

Undergrad Expo. IMECE2018-90117
Thomas Van Fossen, *Rose-Hulman Institute of Technology, Terre Haute, IN, United States*

66. Analysis of Inherent Residual Stress Developed Through Direct Metal Laser Sintering of 316L Stainless Steel

Undergrad Expo. IMECE2018-90118
Bailey Stillman, Joe Fahmy, Ethan Stiles, Jacob Lewallen, Jerome Suminski, Tyrele Adams, *Western Carolina University, Cullowhee, NC, United States*

67. Rule-based Control of Micro-Combined Heat and Power Systems

Undergrad Expo. IMECE2018-90119
Catherine Weaver, Neera Jain, *Purdue University, West Lafayette, IN, United States*

68. A Study of the Effect of Fatigue Loading on the Behavior of Additive Manufactured Parts

Undergrad Expo. IMECE2018-90120
Patricia Cupay, Constance Ziemian, *Bucknell University, Lewisburg, PA, United States*

69. Geometric Effects on 3D Coating by Self-Limiting Electro spray

Undergrad Expo. IMECE2018-90121
Dylan Kovacevich, *Rutgers University, Belle Mead, NJ, United States*, Lin Lei, Jonathan Singer, *Rutgers University, Piscataway, NJ, United States*

70. Mathematically Modeling Hysteresis of Polymer-Derived Ceramics

Undergrad Expo. IMECE2018-90122
J. Lin, *California State University, Los Angeles, Los Angeles, CA, United States*

71. Computational Hydrodynamic Analysis of Reconfigurable Origami Robots

Undergrad Expo. IMECE2018-90123
Andres Zambrano, *University of Pennsylvania, Philadelphia, PA, United States*

72. Limits in trajectory-based deblurring

Undergrad Expo. IMECE2018-90124

Beatriz Fusaro, *Georgia Institute of Technology, Atlanta, GA, United States*

73. Development of High-Performance Nanofibers from Worm Silk: Nanomanufacturing, Characterization, and Nanomechanical Testing

Undergrad Expo. IMECE2018-90125

Iakov Golman, *University of Nebraska Lincoln, Lincoln, NE, United States*, **Mohammad N. Andalib**, *University of Nebraska – Lincoln, Lincoln, NE, United States*, **Yuris Dzenis**, *Univ of Nebraska, Lincoln, NE, United States*

74. Development of a Robotic Coffee Harvester Using computer aided design and virtual reality methods

Undergrad Expo. IMECE2018-90126

Jeyson Andres Hernandez Barbosa, *Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia*, **Helio Sneyder Esteban Villegas**, *Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia*, **Andrés F. Aldana**, *Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia*, **Brajan Nicolas Ruiz Romero**, **Sebastian Roa Prada**, **Oscar E. Rueda**, *Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia*

75. Underground and Overhead Transmission of Electric Power Systems

Undergrad Expo. IMECE2018-90127

Harshitha Gadangi, *Rutgers University, Piscataway, NJ, United States*, **Assimina Pelegri**, *Rutgers University, East Brunswick, NJ, United States*

**TRACK 15 NSF (INCLUDES NSF STUDENT COMPETITION
(POSTERS ONLY))**

ACKNOWLEDGMENT

Track Organizer

Stephen Tse, *Rutgers University, United States*

Topic Organizers

Po-hao Huang, *University of Arkansas, United States*

Zhiting Tian, *Virginia Tech, United States*

TRACK 15 NSF (INCLUDES NSF STUDENT COMPETITION (POSTERS ONLY))

WEDNESDAY, NOVEMBER 14

15-1 NSF-FUNDED RESEARCH**15-1-1****Exhibit Hall B****11:45am–2:30pm****1. Transfer Printing of Integrated Electronics Onto Cross-Linked Collagen**

Poster Presentation. IMECE2018-88523

Salvador Moreno, Manuel Lopez-Quevedo, Majid Minary, University of Texas at Dallas, Richardson, TX, United States

2. Preparing for Academic Careers: Efficacy of Continuous Holistic Faculty Development

Poster Presentation. IMECE2018-88895

Louis Everett, University of Texas at El Paso, El Paso, TX, United States

3. Radiative Thermal Conduction by Plasmonic Resonator Chains in Semiconductor Nanowires

Poster Presentation. IMECE2018-89066

Eric Tervo, Michael Gustafson, Baratunde Cola, Zhuomin Zhang, Michael Filler, Georgia Institute of Technology, Atlanta, GA, United States

4. Two Part Natural Adhesive at Nano-Interfaces in Bone

Poster Presentation. IMECE2018-89072

Seyedreza Morsali, Yang Wang, Qian Qian, Majid Minary, University of Texas at Dallas, Richardson, TX, United States

5. Nature's Strategy to Enhance Mechanical and Fracture Properties of Nacre (Mother of Pearl)

Poster Presentation. IMECE2018-89080

Sina Askarinejad, University of Cambridge, Cambridge, United Kingdom, Nima Rahbar, Worcester Polytechnic Institute, Worcester, MA, United States

6. Role of Circumferential and Longitudinal Smooth Muscle in Murine Vaginal Tissue

Poster Presentation. IMECE2018-89132

Gabrielle L. Clark, Dylan J. Lawrence, Sarah H. Lindsey, Tulane University, New Orleans, LA, United States, Laureophile Desrosiers, Leise R. Knoepp, Ochsner Clinical School, New Orleans, LA, United States, Carolyn L. Bayer, Kristin S. Miller, Tulane University, New Orleans, LA, United States

7. Classification of Activities of Daily Living Based on Hand Kinematics Obtained Using an IR Depth Sensor

Poster Presentation. IMECE2018-89169

Hajar Sharif, Pramod Chembrammel, University of Illinois at Urbana Champaign, Urbana, IL, United States, T. Kesavadas, University of Illinois at Urbana-Champaign, Mahomet, IL, United States

8. On the Multi-Field Processing of Magnetoactive Elastomeric Composites

Poster Presentation. IMECE2018-89182

Md. Abdulla Al Masud, Zoubeida Ounaies, Paris vonLockette, Pennsylvania State University, State College, PA, United States

9. Interfacial and Transport Property Measurements of Liquid Sodium Within a Porous Structure

Poster Presentation. IMECE2018-89199

Alexander Limia, Peter Kottke, Daniel Silverstein, Andrei G. Fedorov, Shannon K. Yee, Georgia Institute of Technology, Atlanta, GA, United States

10. Suction Effects in Crater Arrays

Poster Presentation. IMECE2018-89205

Liu Wang, KyoungHo Ha, Shutao Qiao, Nanshu Lu, University of Texas at Austin, Austin, TX, United States

11. Adhesion and Friction Control the Aspect Ratio and Strain in 2D Material Blisters

Poster Presentation. IMECE2018-89210

Zhaohai Dai, Nanshu Lu, University of Texas at Austin, Austin, TX, United States

12. Self-Cleaning, High Transmission, Near Unity Haze OTS/Silica Nanostructured Glass

Poster Presentation. IMECE2018-89211

Sajad HaghaniFar, Paul Leu, University of Pittsburgh, Pittsburgh, PA, United States

13. Flexible Nanoglass With Highest Combination of Transparency and Haze for Optoelectronic Plastic Substrates

Poster Presentation. IMECE2018-89243

Sajad HaghaniFar, Paul Leu, University of Pittsburgh, Pittsburgh, PA, United States

14. Exploring Biases Between Human and Machine Generated Designs

Poster Presentation. IMECE2018-89244

Christian Lopez, Pennsylvania State University, Newport, PA, United States, Conrad Tucker, Pennsylvania State University, State College, PA, United States, Scarlett Miller, Pennsylvania State University, University Park, PA, United States

15. Atomistic Simulations of Mechanical Properties of Circular and Collapsed Carbon Nanotubes With Covalent Cross-Links

Poster Presentation. IMECE2018-89260

Arun Thapa, Alexey Volkov, University of Alabama, Tuscaloosa, AL, United States

16. Numerical Investigation of Internal Forces During Carbon Nanotube Forest Self-Assembly

Poster Presentation. IMECE2018-89293

Taher Hajilounezhad, Matthew Maschmann, University of Missouri, Columbia, MO, United States

17. Electric Field Effects on KTN Ferroelectric Phase Transitions Studied by Ultrasound Pulse-Echo Technique
Poster Presentation. IMECE2018-89300

Robert Mech, *Gordon College, Wenham, MA, United States*

18. The Path to Optical Sorting of Large Dielectric Microparticles With Whispering Gallery Modes
Poster Presentation. IMECE2018-89301

Alexander King, Nathan J. Jordan, *Gordon College, Wenham, MA, United States*

19. Maximizing Energy Efficiency and Minimizing Thermal Dose in Electrosurgical Tissue Joining Processes
Poster Presentation. IMECE2018-89311

Scott Phillips, *Washington State University, Bellevue, WA, United States*, Che-Hao Yang, Roland Chen, *Washington State University, Pullman, WA, United States*

20. Numerical Studies on Dynamic Interactions Between Lugged Wheel and Granular Media
Poster Presentation. IMECE2018-89313

Preethi Ravula, Gizem Dilber Acar, *University of Maryland, College Park, College Park, MD, United States*, Balakumar Balachandran, *University of Maryland, College Park, Rockville, MD, United States*

21. Effects of Target Thickness on Interfaces of Impact Welds
Poster Presentation. IMECE2018-89320

Tae-seon Lee, Anupam Vivek, Glenn Daehn, *Ohio State University, Columbus, OH, United States*

22. Scalable Pulsed Light Sintering of Nanomaterials
Poster Presentation. IMECE2018-89334

Michael Dexter, *Rutgers, The State University of New Jersey, Middlesex, NJ, United States*, Hyun-Jun Hwang, Rajiv Malhotra, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, Chih-Hung Chang, *Oregon State University, Corvallis, OR, United States*

23. Tunable Granular Metamaterials Based Upon Wave Propagation Analysis Using Granular Micromechanics
Poster Presentation. IMECE2018-89335

Nima NejadSadeghi, Anil Misra, *University of Kansas, Lawrence, KS, United States*

24. Additive Manufacturing Aids the Verification of Granular Micromechanics Model
Poster Presentation. IMECE2018-89339

Nima NejadSadeghi, Anil Misra, *University of Kansas, Lawrence, KS, United States*

25. Effects of Environmental Conditions on Geometrical and Mechanical Properties of Polycarbonate Samples Made by the Fused Filament Fabrication Process
Poster Presentation. IMECE2018-89344

Yishu Yan, Lichen Fang, Ojaswi Agarwal, Kevin Hemker, Sung Kang, *Johns Hopkins University, Baltimore, MD, United States*

26. Titanium Oxynitride Thin Films With Large Power Conversion Efficiency in Photovoltaic Solar Cells
Poster Presentation. IMECE2018-89348

Nikhil Reddy Mucha, Surabhi Shaji, Panupong Jaipan, *North Carolina A&T State University, Greensboro, NC, United States*, Monica Kathiyar, *Indian Institute of Technology, Kanpur, India*, Jeffrey Shield, *University of Nebraska Lincoln, Lincoln, NE, United States*, Hemali Rathnayake, *University of North Carolina at Greensboro, Greensboro, NC, United States*, Dhananjay Kumar, *North Carolina A&T State University, Greensboro, NC, United States*

27. Rate Dependent Fracture Under Mixed-Mode Loading Conditions for an Epoxy/Silicon Interface
Poster Presentation. IMECE2018-89365

Tianhao Yang, Rui Huang, Kenneth Liechti, *University of Texas at Austin, Austin, TX, United States*

28. Validated Nonlinear Finite Element Analysis of Wire Rope Isolators Under Dynamic Excitations
Poster Presentation. IMECE2018-89381

Hamid Ghasemi, Claudia Marin, *Howard University, Washington, DC, United States*

29. Contactless Ultrafast Actuation by Using Photomechanical Instabilities in Azobenzene-Functionalized Polymers
Poster Presentation. IMECE2018-89395

Junfeng Gao, *University of Pittsburgh, Pittsburgh, PA, United States*, Matthew L. Smith, *Hope College, Holland, MI, United States*, M. Ravi Shankar, *University of Pittsburgh, Pittsburgh, PA, United States*

30. Homogenization and Stochastic Fracture Simulation of Quasi-Brittle Materials
Poster Presentation. IMECE2018-89436

Bahador Bahmani, *University of Tennessee, Knoxville, Tullahoma, TN, United States*, Reza Abedi, *University of Tennessee, Tullahoma, TN, United States*, Philip L. Clarke, *University of Tennessee Space Institute, Tullahoma, TN, United States*, Anand Nagarajan, Ming Yang, *Ohio State University, Columbus, OH, United States*, Soheil Soghrati, *Ohio State University, Dublin, OH, United States*, Katherine A. Acton, *University of St. Thomas, St. Paul, MN, United States*

31. Understanding and Predicting Properties and Performance of Additively Manufactured Nickel-Based Superalloys
Poster Presentation. IMECE2018-89437

Weitao Shan, Grace V. de Leon Nope, *University of Pittsburgh, Pittsburgh, PA, United States*

32. Adaptive Space-Time Deep-Learning Enabled Multiscale Poromechanics
Poster Presentation. IMECE2018-89460

Kun Wang, Waiching Sun, *Columbia University, New York, NY, United States*

33 Effects of Varying Processing Parameters on the Thermo-Physical Properties of 316L Stainless Steel Fabricated by Selective Laser Melting

Poster Presentation. IMECE2018-89463

Nigel Amofo-Yeboah, Southern University and A&M College, Baton Rouge, LA, United States, **Patrick Mensah**, Southern University, Baton Rouge, LA, United States, **Stephen Akwaboa**, Southern University and A&M College, Baton Rouge, LA, United States, **Samuel Ibekwe**, Southern University, Baker, LA, United States

34. Modeling of Multiphase Heat Transfer in Microscale Heat Sinks

Poster Presentation. IMECE2018-89466

Kojo Asiamah Osafo, Southern University A&M College, Baton Rouge, LA, United States, **Patrick Mensah**, Southern University, Baton Rouge, LA, United States, **Stephen Akwaboa**, Southern University and A&M College, Baton Rouge, LA, United States

35. Experimental Investigation of Structural Power Flow in 2D Locally Resonant Elastic Metamaterials

Poster Presentation. IMECE2018-89483

Hasan Al Ba'ba'a, Mostafa Nouh, University at Buffalo, State University of New York, Buffalo, NY, United States

36. 3D Printing of Molecularly Ordered Heterogeneous Active Matter

Poster Presentation. IMECE2018-89486

Mohsen Tabrizi, University of Pittsburgh, Pittsburgh, PA, United States, **Mohand Saed**, Taylor Ware, University of Texas at Dallas, Richardson, TX, United States, **M. Ravi Shankar**, University of Pittsburgh, Pittsburgh, PA, United States

37. Competitive Two-Stage Location and Pricing Decisions on a Network: An Air Transportation Case Study

Poster Presentation. IMECE2018-89517

Reed Harder, **Vikrant Vaze**, Dartmouth College, Hanover, NH, United States

38. Design of Tribological Composites for Multi-Functional Applications

Poster Presentation. IMECE2018-89520

Xiu Jia, **Tomas Grejtak**, **Brandon A. Krick**, **Natasha Vermaak**, Lehigh University, Bethlehem, PA, United States

39. Pro-Environmental Social Influence via Randomized Incentive Programs

Poster Presentation. IMECE2018-89540

John Edgar Fontecha Garcia, University at Buffalo, State University of New York, Buffalo, NY, United States, **Manjunath Jois**, U.S. Coast Guard, Elizabeth City, NC, United States, **Jose L. Walteros**, **Alexander Nikolaev**, University at Buffalo, State University of New York, Buffalo, NY, United States

40. Microelasticity Modeling of Microstructures

Poster Presentation. IMECE2018-89555

Zachary J. Morgan, **Yongmei M. Jin**, Michigan Technological University, Houghton, MI, United States

41. Scaling Laws for Porous Solids With Intermediate Relative Densities

Poster Presentation. IMECE2018-89575

Timothy Ibru, Georgia Institute of Technology, Decatur, GA, United States, **Vadim Roytershteyn**, Space Science Institute, Boulder, CO, United States, **Garritt Tucker**, Colorado School of Mines, Golden, CO, United States, **Antonia Antoniou**, Georgia Institute of Technology, Atlanta, GA, United States

42. Parameter Identification Through Analysis of Electro-Elastic Nonlinearities in Ultrasound Acoustic Energy Transfer Systems

Poster Presentation. IMECE2018-89578

Vamsi Chandra Meesala, Virginia Tech, Blacksburg, VA, United States, **Muhammad Hajj**, Stevens Institute of Technology, Hoboken, NJ, United States, **Shima Shahab**, Virginia Tech, Blacksburg, VA, United States

43. X-Ray Analysis of Melt-Spun Nanostructured NiTiCu Shape Memory Ribbons

Poster Presentation. IMECE2018-89603

Prashant Gunai, **Pranav Bhale**, **Prina Ari-Gur**, Western Michigan University, Kalamazoo, MI, United States

44. Second-Order Homogenization Estimates for the Macroscopic Behavior and Field Fluctuations in Viscoplastic Composites and Comparisons With Full-Field Simulations

Poster Presentation. IMECE2018-89609

Joshua Furer, **Pedro Ponte Castañeda**, University of Pennsylvania, Philadelphia, PA, United States

45. Origin of Nanoscale Friction Contrast Between Graphene and MoS₂

Poster Presentation. IMECE2018-89612

Han Ye, University of Pennsylvania, Philadelphia, PA, United States, **Zhijiang Ye**, Miami University, Oxford, OH, United States, **Mohammad R. Vazirisereshk**, University of California, Merced, Merced, CA, United States, **Mengqiang Zhao**, **A.T. Charlie Johnson**, University of Pennsylvania, Philadelphia, PA, United States, **Ashlie Martini**, University of California, Merced, Atwater, CA, United States, **Robert W. Carpick**, University of Pennsylvania, Philadelphia, PA, United States

46. A Comprehensive Study of Soft Porous Lubrication, From Red Cells to Skiing/Snowboarding

Poster Presentation. IMECE2018-89621

Zenghao Zhu, **Qianhong Wu**, Villanova University, Villanova, PA, United States

47. Optimizing the Input Parameters of Binder Jetting for the Additive Manufacturing (AM) of Aluminum Oxide

Poster Presentation. IMECE2018-89628

Edgar Mendoza, Carnegie Mellon University, Pittsburgh, PA, United States

48. The Taylor-Culick Profile for Spinning Rocket Motors

Poster Presentation. IMECE2018-89629

Orie Cecil, **Joseph Majdalani**, Auburn University, AL, United States

49. Effects of Surface Energy Reducing Agents on Adhesion Force in Liquid Bridge Microstereolithography

Poster Presentation. IMECE2018-89638

Aslan Bafahm Alamdari, Jeongwoo Lee, Md. Omar Faruk Emon, Jae-Won Choi, *University of Akron, Akron, OH, United States*

50. Chance-Constrained Optimal Control Approach to Optimal Path Planning

Poster Presentation. IMECE2018-89648

Rachit Aggarwal, Mrinal Kumar, *Ohio State University, Columbus, OH, United States*

51. Hydrodynamic Performance of Optimal Flexible Hydrofoil Kinematics for Biomimetic Design

Poster Presentation. IMECE2018-89656

Hisham Shehata, Craig Woolsey, Muhammad Hajj, *Virginia Tech, Blacksburg, VA, United States*

52. In Situ Monitored Self-Assembly of 3D Graphene-Based Nanostructures

Poster Presentation. IMECE2018-89662

Chunhui Dai, Kriti Agarwal, Jeong-Hyun Cho, *University of Minnesota, Minneapolis, MN, United States*

53. Design of 2D/3D-Helmholtz Coil Systems for Driving FePd Nanohelix Nanorobots for Cancer Treatment and of Dynamic Mechanical Tester System for Layered Structure of Agarose Gel and Cancer Cells

Poster Presentation. IMECE2018-89684

Minoru Taya, Cerwyn Chiew, Satomi Takao, *University of Washington, Seattle, WA, United States*

54. A Comprehensive Study of Fluid Flow in a Soft Porous Material Under Compaction

Poster Presentation. IMECE2018-89700

Qiuyun Wang, *Villanova University, Chesterbrook, PA, United States*, Qianhong Wu, *Villanova University, Villanova, PA, United States*

55. New Design of a Mechanical Transducer in Atomic Force Microscopy for Imaging Beyond Topography

Poster Presentation. IMECE2018-89724

Sajith Dharmasena, *Ohio State University, Columbus, OH, United States*, Randi Potekin, *Purdue University, Purdue, IN, United States*, Zining Yang, Seok Kim, Lawrence Bergman, Alexander Vakakis, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, Hanna Cho, *Ohio State University, Columbus, OH, United States*

56. Novel Supply Chain and Process Modeling for Cell Therapy Manufacturing and Distribution

Poster Presentation. IMECE2018-89756

Yi Liu, Robert Bishop, Aubrey Incorvaia, *Georgia Institute of Technology, Atlanta, GA, United States*, Amritava Das, *University of Wisconsin-Madison, Madison, WI, United States*, Bhavya Divvela, *Georgia Institute of Technology, Atlanta, GA, United States*, Krishanu Saha, *University of Wisconsin-Madison, Madison, WI, United States*, Aaron Levine, Kan Wang, Chelsea White, Ben Wang, *Georgia Institute of Technology, Atlanta, GA, United States*

57. High Prandtl Number Facility for Study of Rayleigh-Benard Convection in Various Container Shapes

Poster Presentation. IMECE2018-89757

Jessica Imgrund, Hamed Ziad Ammar, Stephen R. Johnston, *Georgia Institute of Technology, Atlanta, GA, United States*, Enrico Fonda, *New York University, Brooklyn, NY, United States*, Devesh Ranjan, *Georgia Institute of Technology, Atlanta, GA, United States*, Katepalli R. Sreenivasan, *New York University, Brooklyn, NY, United States*

58. Fuzzy Logic Utilization for UAV Path Planning

Poster Presentation. IMECE2018-89777

Zoe Lee, Manish Kumar, Kelly Cohen, *University of Cincinnati, Cincinnati, OH, United States*

59. Theoretical and Experimental Study of Transient Squeezing Flow

Poster Presentation. IMECE2018-89813

Ji Lang, Qianhong Wu, *Villanova University, Villanova, PA, United States*

60. Atomistic Simulation and Classical Nucleation Theory of Edge Dislocation Jog-Pair Formation in Aluminum

Poster Presentation. IMECE2018-89816

Anas Abu-Odeh, Maeva Cottura, Mark Asta, *University of California, Berkeley, Berkeley, CA, United States*

61. Adhesion Study for Robotic 3D Printing

Poster Presentation. IMECE2018-89836

Arriana Nwodu, *Florida Agricultural & Mechanical University, Tallahassee, FL, United States*, Raquel Werner, Jolie Frketic, *Florida State University, Tallahassee, FL, United States*, Tarik Dickens, *Florida Agricultural & Mechanical University, Tallahassee, FL, United States*

62. Magnetocaloric Properties of Fe₉₀Ta₁₀ Thin Films

Poster Presentation. IMECE2018-89850

Surabhi Shaji, *North Carolina A&T State University, Greensboro, NC, United States*, Prakash Giri, *University of Nebraska-Lincoln, Lincoln, NE, United States*, Nikhil Reddy Mucha, *North Carolina A&T State University, Greensboro, NC, United States*, Christian Binek, *University of Nebraska-Lincoln, Lincoln, NE, United States*, Dhananjay Kumar, *North Carolina A&T State University, Greensboro, NC, United States*

63. Experimental Assessment of Miniature Accelerometers Designed for Sensing Middle Ear Motion

Poster Presentation. IMECE2018-89857

Alison Hake, Chuming Zhao, *University of Michigan, Ann Arbor, MI, United States*, Wang-Kyung Sung, *Vesper Technologies Inc., Boston, MA, United States*, Karl Grosh, *University of Michigan, Ann Arbor, MI, United States*

64. Influence of Gold Catalyst on the Growth of Titanium Nitride Nanowires

Poster Presentation. IMECE2018-89858

Panupong Jaipan, Chandra Nannuri, Nikhil Reddy Mucha, Kaushik Sarkar, *North Carolina A&T State University, Greensboro, NC, United States*, Adele Moatti, Jay Narayan, *North Carolina State University*, Svitlana Fialkova, Dhananjay Kumar, *North Car*

65. Design and Validation of New Cryogenic Nitrogen Facility for Exploration of Rayleigh-Benard Convection at High Rayleigh Numbers

Poster Presentation. IMECE2018-89861

Stephen R. Johnston, **Jessica Imgrund**, *Georgia Institute of Technology, Atlanta, GA, United States*, **Enrico Fonda**, **Katepalli R. Sreenivasan**, *New York University, Brooklyn, NY, United States*, **Devesh Ranjan**, *Georgia Institute of Technology, Atlanta, GA, United States*

66. Dependence of Mechanical Characteristics of Polymer-Grafted Particle Films on Chain Architecture

Poster Presentation. IMECE2018-89868

Jaejun Lee, **Zongyu Wang**, **Tingwei Deng**, **Robert F. Davis**, **Krzysztof Matyjaszewski**, **Micheal R. Bockstaller**, *Carnegie Mellon University, Pittsburgh, PA, United States*

67. A Combined Experimental and Computational Study on the Process-Structure-Property Relationship of Additively Manufactured Bi-Continuous Piezocomposites

Poster Presentation. IMECE2018-89872

Zhuo Wang, *Mississippi State University, Starkville, MS, United States*, **Li He**, *University of Iowa, Iowa City, IA, United States*, **Wenhua Yang**, *Mississippi State University, Starkville, MS, United States*, **Xuan Song**, *University of Iowa, Iowa City, IA, United States*, **Lei Chen**, *Mississippi State University, Starkville, MS, United States*

68. Additive Manufacturing of Complex Micro-Architected Graphene Aerogels

Poster Presentation. IMECE2018-89882

Ryan Hensleigh, **Huachen Cui**, *Virginia Tech, Blacksburg, VA, United States*, **James Oakdale**, **Jianchao Ye**, **Patrick Campbell**, **Eric Duoss**, **Christopher M. Spadaccini**, *Lawrence Livermore National Laboratory, Livermore, CA, United States*, **Xiaoyu Zheng**, *Virginia Tech, Blacksburg, VA, United States*, **Marcus Worsley**, *Lawrence Livermore National Laboratory, Livermore, CA, United States*

69. Phase Transforming Architected/Cellular Materials Under Biaxial/Multiaxial Loading Conditions

Poster Presentation. IMECE2018-89887

Yunlan Zhang, **Mirian Velay**, **Pablo Zavattieri**, *Purdue University, West Lafayette, IN, United States*, **David Restrepo**, *San Antonio University, San Antonio, TX, United States*, **Nilesh Mankame**, *General Motors Research & Development, Warren, MI, United States*

70. A Comparative Study on Selective Laser Melting and Electron Beam Additive Manufacturing Processes

Poster Presentation. IMECE2018-89915

M. Shafiqur Rahman, **Paul D. Herrington**, **Paul Schilling**, *University of New Orleans, New Orleans, LA, United States*, **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States*

71. A Microstructure-Based Modeling Approach for Electrostriction in Relaxor

Poster Presentation. IMECE2018-89919

Anil Erol, **Paris Von Lockette**, *Pennsylvania State University, University Park, PA, United States*

72. Mapping of Phonon Modes Between Two-Dimensional and Three-Dimensional Systems

Poster Presentation. IMECE2018-89920

Hyun-Young Kim, **Alan McGaughey**, *Carnegie Mellon University, Pittsburgh, PA, United States*

73. Assessment of Angiogenesis and Cell Survival of a Multi-Layered Bio-printed Aortic Construct

Poster Presentation. IMECE2018-89932

Beu P. Oropeza, **Luis H. Solis**, **Daisy Alvarado**, **Jesus Castor**, **Mirsa Gonzalez Favela**, **Alba Leyva**, **Emilio Loera**, **Gisela Lopaz**, **Fernanda Lugo**, **Erik Munoz**, **Paola Rodriguez**, **Leila Subia**, **Valeria Altamirano**, **Jesus Cedeno**, **Dante Chaparro Vega**, **Octavio Cordova**, **Isaac Deaguero**, **Erwin Delgado**, **Michael Furth**, **Mario Garcia**, **Tania Miramontes**, **Carlos Serna**, **Arahim Zuniga Herrera**, **Thomas Boland**, *University Texas at El Paso, El Paso, TX, United States*

74. Removal of Off-Flavor Compounds in Aquaculture Environment: Optimizing New Techniques for Sustainable Aquaculture Systems

Poster Presentation. IMECE2018-89944

Tunan Peng, **Norma Alcantar**, *University of South Florida, Tampa, FL, United States*

75. Continuous Phase Transition Control of Vanadium Dioxide Using Feedback Mechanism

Poster Presentation. IMECE2018-89955

Jiguo Dai, **Chandika Annasiwatta**, **Jordan Berg**, **Ayrton Bernussi**, **Zhaoyang Fan**, **Beibei Ren**, *Texas Tech University, Lubbock, TX, United States*

76. Design and Additive Manufacturing of Self-Sensing Architected Metamaterials

Poster Presentation. IMECE2018-89986

Amanda Wei, **Xiaoyu Zheng**, *Virginia Tech, Blacksburg, VA, United States*

77. Welding Robotic Co-Worker: Autonomous Welding Seam Extraction

Poster Presentation. IMECE2018-90020

Yao Li, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **T. Kesavadas**, *University of Illinois at Urbana-Champaign, Mahomet, IL, United States*

15-2 NSF RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU)

15-2-1

11:45am–2:30pm

78. Custom Instrumentation for Vibration Assisted Nano Abrasive Machining Process

Poster Presentation. IMECE2018-89111

Nathan Darkins, *University of Cincinnati, Cincinnati, OH, United States*, **Anne Brant**, *University of Cincinnati, Blue Ash, OH, United States*, **Murali Sundaram**, *University of Cincinnati, Cincinnati, OH, United States*

79. Printing of Three Dimensional Metal Structures by Electrochemical Additive Manufacturing

Poster Presentation. IMECE2018-89112

Narek Manukyan, *University of Cincinnati, Cincinnati, OH, United States*, **Anne Brant**, *University of Cincinnati, Blue Ash, OH, United States*, **Murali Sundaram**, *University of Cincinnati, Cincinnati, OH, United States*

80. Dispersion Mechanics of Inertially Amplified Acoustic Metamaterials

Poster Presentation. IMECE2018-89484

David DePauw, **Mostafa Nouh**, *University at Buffalo, State University of New York, Buffalo, NY, United States*

81. Water Desalination Using UV-Polymerizable Lyotropic Liquid Crystal-Carbon Nanotube Composite Membranes

Poster Presentation. IMECE2018-89492

Dominique Porcincula, *California Polytechnic State University, San Luis Obispo, CA, United States*, **Chris Kasprzak**, *Virginia Tech, Blacksburg, VA, United States*, **Alejandro Madriz**, **Shanju Zhang**, *California Polytechnic State University, San Luis Obispo, CA, United States*

82. Failure Resilient Design of an Electro-Hydrostatic Actuator Based Flight Control System

Poster Presentation. IMECE2018-89635

Samuel Zelman, **Pingfeng Wang**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

83 Nanoporous Copper in Dentin Resin Composites

Poster Presentation. IMECE2018-89642

Sarah Violante, *Georgia Institute of Technology, Atlanta, GA, United States*, **Timothy Ibru**, *Georgia Institute of Technology, Decatur, GA, United States*, **Antonia Antoniou**, *Georgia Institute of Technology, Atlanta, GA, United States*

84. Research Experience for Teachers: Similarities With REU Experience

Poster Presentation. IMECE2018-89776

Chris Kobus, **Xia Wang**, *Oakland University, Rochester, MI, United States*

85. Mechanical Behavior of Poly(lactic Acid) Undergoing Degradation

Poster Presentation. IMECE2018-89792

Anton Venediktov, *New Jersey Institute of Technology, Newark, NJ, United States*, **Shawn Chester**, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

86. Optimizing Microrobotic Flight With Two-Photon Polymerization

Poster Presentation. IMECE2018-89802

Lisa Soderlind, **Igor Paprotny**, *University of Illinois at Chicago, Chicago, IL, United States*

87. Fabrication and Characterization of Colored Nanoporous Sol-Gel Glasses

Poster Presentation. IMECE2018-89878

Chih-Hung Chang, **Alvin Chang**, **Yujuan He**, *Oregon State University, Corvallis, OR, United States*, **Maria Torres Arango**, *West Virginia University, Morgantown, WV, United States*, **Rajiv Malhotra**, *Rutgers, The State University of New Jersey, New Brunswick, NJ, United States*, **Kostas Sierros**, *West Virginia University, Morgantown, WV, United States*, **Zhenxing Feng**, **Maoyu Wang**, *Oregon State University, Corvallis, OR, United States*, **Yang Ren**, *APS, Argonne, IL, United States*

88. Papertronic Leak Detectors

Poster Presentation. IMECE2018-89961

Mauroof Khan, **Ramendra Pal**, **Xiyue Zou**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*, **Urvish Patel**, *Rutgers, The State University of New Jersey, Carteret, NJ, United States*, **Aaron Mazzeo**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

89. Flexible and Conformal Paper-Based, Force-Sensing Pads

Poster Presentation. IMECE2018-89978

Cora LoPresti, **Tongfen Liang**, **Xiyue Zou**, **Aaron Mazzeo**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

TRACK 16 VIRTUAL PODIUM (POSTERS)

- 16-1-1: Acoustics, Vibration, and Phononics**
- 16-2-1: Advanced Manufacturing**
- 16-4-1: Biomedical & Biotechnology Engineering**
- 16-5-1: Design, Reliability, Safety, and Risk**
- 16-6-1: Dynamics, Vibration, and Control**
- 16-7-1: Engineering Education**
- 16-8-1: Energy**
- 16-9-1: Fluids Engineering**
- 16-10-1: Heat Transfer and Thermal Engineering**
- 16-11-1: Materials: Genetics to Structures**
- 16-12-1: Mechanics of Solids, Structures and Fluids**
- 16-13-1: Society-Wide Micro and Nanotechnology Forum**
- 16-14-1: Best Student Poster Competition on Computational Mechanics**

ACKNOWLEDGMENT

Track Organizer

Albert Ratner, *University of Iowa, United States*

Topic Organizers

Qian Qian, *University of Texas at Dallas, United States*
Ganesh Balasubramanian, *Lehigh University, United States*
Jun Liu, *North Carolina State University, United States*
Bo Li, *Villanova University, United States*
Caglar Oskay, *Vanderbilt University, United States*

TRACK 16 VIRTUAL PODIUM (POSTERS)

WEDNESDAY, NOVEMBER 14

16-1 ACOUSTICS, VIBRATION, AND PHONONICS**16-1-1 Acoustics, Vibration, and Phononics**

Exhibit Hall B

11:45am–2:30pm

90. On the Role of Geometry Parameters in the Dynamic Characteristic and Stability of Wave Journal Bearings

Poster Paper Publication. IMECE2018-88258

Baisong Yang, *Xi'an Jiaotong University, Shaanxi, China*, Sheng Feng, Haipeng Geng, Jian Zhou, Lie Yu, *Xi'an Jiaotong University, Xi'an City, China***91. Origami-Based Elastic Metamaterials for Low Frequency Vibration Suspension and Flexural Wave Control**

Poster Presentation. IMECE2018-88516

Mingkai Zhang, *Beijing Institute of Technology, Beijing, Beijing, China*, Rui Zhu, *University of Washington, Seattle, WA, United States***92. Vorticoacoustic Stability Analysis of the Bidirectional Vortex Engine**

Poster Presentation. IMECE2018-89037

Paul Kovacic, *Auburn University, Auburn, AL, United States***93. Analyzing the Interaction of Neural Signals in the Auditory Brain Structures With Applied Signal Processing Technologies**

Poster Presentation. IMECE2018-89283

Na Zhu, Casey Chisnell, *University of Michigan–Flint, Flint, MI, United States*, Hao Luo, Jinsheng Zhang, *Wayne State University, Detroit, MI, United States***16-2 ADVANCED MANUFACTURING****16-2-1 Advanced Manufacturing**

11:45am–2:30pm

94. Solution-Gated Ion-Sensitive Field Effect Transistor With Polymer Selective Membrane for Nitrate Detection

Poster Paper Publication. IMECE2018-87918

Jungyoon Kim, Qingyuan Liu, Tianhong Cui, *University of Minnesota, Minneapolis, MN, United States***95. Development of a Low Coefficient of Thermal Expansion Composite Tooling via 3D Printing**

Poster Paper Publication. IMECE2018-88594

Pedro Cortes, Michael Maravola, Michael Juhasz, Douglas Rutana, Bridger Kowalczyk, Brett Conner, Eric Macdonald, *Youngstown State University, Youngstown, OH, United States***96. Dynamic Testing of Polymeric AM Parts With Different Infill Conditions**

Poster Presentation. IMECE2018-88702

Serdar Tumkor, Jonathan Holman, Jace, M. Rearick, Mitchell, D. Krinock, Joe Doerfler, *University of Pittsburgh, Johnstown, PA, United States***97. Design Innovation in a Water Well Potable Drilling Machine**

Poster Presentation. IMECE2018-88776

Rufus Chime, *Institute of Management and Technology, Enugu State, Nigeria***98. Design Innovation in Palm Kernel Cracking Machine: Design for Manufacturing**

Poster Presentation. IMECE2018-88777

Rufus Chime, *Institute of Management and Technology, Enugu State, Nigeria***99. Machining and Bio-Machining Considerations**

Poster Presentation. IMECE2018-88989

Satya Prasad Paruchuru, *VNRVJIET, Hyderabad, India***100. Considerations for Bulk-Manufacturing Simulators**

Poster Presentation. IMECE2018-88996

Satya Prasad Paruchuru, *VNRVJIET, Hyderabad, India***101. Microscale 3D Printing by Additive Nanoparticle Assembly for Energy Storage Systems and Biomedical Devices**

Poster Presentation. IMECE2018-89039

Sadeq Saleh, Mark Nicholas, Rit Bezbaruah, Eric Yttri, Rahul Panat, *Carnegie Mellon University, Pittsburgh, PA, United States***102. Integrative Additive Manufacturing for Hermetically Sealed Functional Components**

Poster Presentation. IMECE2018-89992

Marquese Pollard, *Florida Agricultural and Mechanical University, Tallahassee, FL, United States***16-4 BIOMEDICAL & BIOTECHNOLOGY ENGINEERING****16-4-1 Biomedical & Biotechnology Engineering**

11:45am–2:30pm

103. Estimation Method of 3D Position of Guidewire in Endovascular Treatment

Poster Paper Publication. IMECE2018-86392

Hirohito Yamamoto, *Yamaguchi University, Yamaguchi, Japan*, Koji Mori, Takashi Saito, Hiroko Kadowaki, *Yamaguchi University, Ube/Yamaguchi, Japan***104. The Effect of Shoe Sole Stiffness on Trunk Lean**

Poster Presentation. IMECE2018-86496

Garrett Sutton, Matthew Yough, Travis Schmeling, Casey Vollmer, Abdulhamid Khawajah, Anne Schmitz, *Gannon University, Erie, PA, United States*

105. A Numerical Bioheat Transfer Model to Estimate Time of Death With Application in Forensic Science

Poster Presentation. IMECE2018-86614

Saeed Tiari, Madeline Carnell, Rebecca Red Horse, Olivia Rose, *Gannon University, Erie, PA, United States*

106. Computational Study of Onset Dynamics in Neuron-Spiking With Threshold Adaptation

Poster Paper Publication. IMECE2018-86689

Loabat Shojaei Kavan, Abhijeet Wadkar, Samuel Asokanathan, *University of Western Ontario, London, ON, Canada*

107. Reproduction Analysis of Injury Condition Using Finite Element Modeling of the Head in Cases With Traumatic Higher Brain Dysfunction Caused by Traffic Accidents

Poster Paper Publication. IMECE2018-86945

Shigeto Hayashi, *Hyogo Emergency Medical Center, Japanese Red Cross Kobe Hospital, KOBE, Japan*, Hiromichi Nakadate, *Shinshu University, Ueda, Japan*, Yuelin Zhang, *Sophia University, Tokyo, Japan*, Kojiro Mekata, Haruo Yamashita, *Japanese Red Cross Kobe Hospital, Kobe, Japan*, Shinichi Nakayama, *Hyogo Emergency Medical Center, Kobe, Japan*, Eiji Kohmura, *Kobe University, Kobe, Japan*, Yasuhiro Matsui, *National Traffic Safety and Environment Laboratory, Chofu, Japan*, Hong Ji, *Beijing Computing Center, Beijing, China*, Shigeru Aomura, *Tokyo Metropolitan University, Hino, Japan*

108. Development of a Low-Cost Hip Flexion Assistive Device

Poster Presentation. IMECE2018-87101

Grace McGrath, Madeline Carnell, Stacy Joseph, Anne Schmitz, *Gannon University, Erie, PA, United States*

109. Effects of Prosthetic Simulator on Muscle Activity

Poster Presentation. IMECE2018-87161

Olivia Rose, Benjamin Reed, Rebecca Red Horse, Aaron Mandrake, Mohammed Ashmouni, *Gannon University, Erie, PA, United States*

110. Monte Carlo Simulation for High-k MOSFET Dosimeters

Poster Presentation. IMECE2018-87170

Hui Niu, *Ansys Inc., Canonsburg, PA, United States*

111. Simulation of the Strain Amplification in Sulci Due to Blunt Impact to the Head

Poster Presentation. IMECE2018-88176

Brian Fagan, *ARL WMRD, Adelphi, MD, United States*, Timothy Zhang, *Sikhanda S. Satapathy, ARL WMRD, APG, MD, United States*

112. Developing Activated Carbon From Date Seeds and Carbon Fiber for Use in Liver Support Devices

Poster Paper Publication. IMECE2018-88233

Ali Hilal-Alnaqbi, Asel Mwafy, Ameereh Seyedzadeh, Waleed Ahmed, Aisha Hilal Alnaqbi, *United Arab Emirates University, Al Ain, United Arab Emir.*

113. Development of a Novel 3D Printing for Porous Bioceramic Scaffolds

Poster Presentation. IMECE2018-88256

Maohua Lin, Yunqing Kang, Chi-tay Tsai, Xuesong Wang, *Florida Atlantic University, Boca Raton, FL, United States*

114. In Silico Analysis of the Failure of Uniaxial Testing Specimens

Poster Presentation. IMECE2018-88381

Ronald Fortunato, *University of Pittsburgh, Venetia, PA, United States*, Chao Sang, Spandan Maiti, Anne M. Robertson, *University of Pittsburgh, Pittsburgh, PA, United States*

115. Breaking Bones

Poster Presentation. IMECE2018-88735

Rebekah Eberle, Bashayr Alturkestani, Anne Schmitz, *Gannon University, Erie, PA, United States*

116. Development of a Lizard PBT Data Collection Apparatus

Poster Presentation. IMECE2018-88809

Jeong Tae Ok, Colton Dorion, William Hendrickson, Kennan Marino, Kevin Tracy, Salim Azzouz, Yu Guo, Charles Watson, *Midwestern State University, Wichita Falls, TX, United States*

117. Three-Dimensional Full-Field Strain Mapping in Total Shoulder Replacement

Poster Presentation. IMECE2018-88902

Yuxiao Zhou, Chujie Gong, *Pennsylvania State University, State College, PA, United States*, Gregory Lewis, April Armstrong, *Pennsylvania State University, Hershey, PA, United States*, Jing Du, *Pennsylvania State University, State College, PA, United States*

118. A Microfluidics-Based Impedimetric Platform for Studying Placental Malaria

Poster Presentation. IMECE2018-88995

Jia Liu, Irina Oleinikov, Olga Chesnokov, Yuhao Qiang, Andrew Oleinikov, Sarah E. Du, *Florida Atlantic University, Boca Raton, FL, United States*

119. Analysis of Precise-Drives for Bio-Instrumentation

Poster Presentation. IMECE2018-88999

Satya Prasad Paruchuru, *VNRVJIET, Hyderabad, India*

120. Unconventional Machining Methods for Bioengineering

Poster Presentation. IMECE2018-89017

Satya Prasad Paruchuru, *VNRVJIET, Hyderabad, India*

121. Manufacturing and Maintenance Aspects of Processes Used for Prostheses

Poster Presentation. IMECE2018-89019

Satya Prasad Paruchuru, *VNRVJIET, Hyderabad, India*

122. Manufacturing and Continuous-Evaluation of Tissue

Poster Presentation. IMECE2018-89078

Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India

123. Protective Capabilities of Metal-Frame Versus Plastic-Frame Softball Fielder's Masks

Poster Presentation. IMECE2018-89084

John Strickland, Grant Bevill, University of North Florida, Jacksonville, FL, United States

124. Computational Modeling of Cough and Mucus Clearance in Patients With Total Laryngectomy Under Expiratory Muscle Strength Training

Poster Presentation. IMECE2018-89086

Nadun Kuruppumullage, University of Central Florida, Oviedo, FL, United States

125. Robust Control Design for Type 1 Diabetes

Poster Presentation. IMECE2018-89246

Souransu Nandi, University at Buffalo, State University of New York, Buffalo, NY, United States, Tarunraj Singh, University at Buffalo, State University of New York, Buffalo, NY, United States

126. Is Cell Alignment Modulated by Cell-Matrix Interaction or Cell-Cell Interaction?

Poster Presentation. IMECE2018-89267

Stephen Coyle, Philip R. LeDuc, Kuen Hsia, Carnegie Mellon University, Pittsburgh, PA, United States

127. Biological Inspiration From Salt-exclusion in Mangroves Toward Anti-Biofouling Reverse Osmosis Membranes

Poster Presentation. IMECE2018-89303

Adam Wood, Carnegie Mellon University, Verona, PA, United States, Kyle Justus, Eric Parigoris, Alan Russell, Philip R. LeDuc, Carnegie Mellon University, Pittsburgh, PA, United States

128. In Situ Bioprinting of Bone Tissue Constructs for Craniomaxillofacial Repair

Poster Presentation. IMECE2018-89380

Kazim Kerim Moncal, Pennsylvania State University, State College, PA, United States

129. 3D Tumor-on-a-Chip With Vasculature for Chemotaxis

Poster Presentation. IMECE2018-89441

Li Wan, Philip R. LeDuc, Carnegie Mellon University, Pittsburgh, PA, United States, Carola Neumann, University of Pittsburgh, Pittsburgh, PA, United States

130. Mechanically-Induced Cholesterol Removal From Macrophage Cells Using Ultrasound

Poster Presentation. IMECE2018-89498

Justin Urso, Chandrakala Aluganti Narasimhulu, Sampath Parthasarathy, Alain Kassab, Subith Vasu, University of Central Florida, Orlando, FL, United States

131. A Nerve-Integrated 3D Tissue on a Chip System to Study the Brain

Poster Presentation. IMECE2018-89626

Justin Bobo, Carnegie Mellon University, Pittsburgh, PA, United States, Manoj Puthenveedu, Zara Weinberg, University of Michigan, Ann Arbor, MI, United States, Philip R. LeDuc, Carnegie Mellon University, Pittsburgh, PA, United States

132. Optimization of Storage Conditions and Evaluation of Stored Drag Reducing Polymer (DRP) Solutions Used in Preclinical Animal Studies

Poster Presentation. IMECE2018-89806

Dan Crompton, Sarah Tolaymat, Salim Olia, Marina Kameneva, University of Pittsburgh, Pittsburgh, PA, United States

133. Switching Super Twisting Sliding Mode Controller for Following Virtual Constraints: Application to a Hybrid Neuroprosthesis

Poster Presentation. IMECE2018-89892

Vahidreza Molazadeh, Zhiyu Sheng, Nitin Sharma, University of Pittsburgh, Pittsburgh, PA, United States

134. PhysioNet-LabView Interface

Poster Presentation. IMECE2018-89959

Andrew-Dave E. Simpson, Douglas E. Dow, Wentworth Institute of Technology, Boston, MA, United States

16-5 DESIGN, RELIABILITY, SAFETY, AND RISK**16-5-1 Design, Reliability, Safety, and Risk**

11:45am–2:30pm

135. Analysis of Temperature Sensor Failure Mechanism for Semiconductor Front-End Equipment Using Finite Element Models

Poster Presentation. IMECE2018-89533

Seung Il Park, Jacobs Somnic, Changwoon Han, State University of New York, Korea, Incheon, Korea (Republic)

136. Emerging Trends in the Measurement of Engineered Surfaces in Aerospace and Weapons System From Rough to Nano Measurement Range

Poster Presentation. IMECE2018-89983

Devdas Shetty, Pawan Tyagi, University of the District of Columbia, Washington, DC, United States

16-6 DYNAMICS, VIBRATION, AND CONTROL

16-6-1 Dynamics, Vibration, and Control

11:45am–2:30pm

137. Commodities and Rail Damage

Poster Paper Publication. IMECE2018-86008

Josè A. Romero, *Queretaro Autonomous University, San Juan del Rio, Queretaro, Mexico*, **Frank Otremba**, *Bundesanstalt für Materialforschung und -prüfung, Berlin, Germany*, **Alejandro A. Lozano-Guzman**, *Applied Science and Advanced Technology Research Center Queretaro Unit, Queretaro, Mexico*

138. The Higher Inharmonic Overtone Vibrations of a Piezoelectric Plate

Poster Presentation. IMECE2018-86622

Zi-Gui Huang, *National Formosa University, Yunlin County, Taiwan*, **Ke-Cheng Zhuang**, **Chien-Cheng Yang**, *Taitien Electronics Co., Ltd., New Taipei City, Taiwan*

139. Vibratory System Identification of 3D Printed Cantilever

Poster Paper Publication. IMECE2018-86840

Daniel Crifasi, **Matthew Ergle**, **Huseyin Ozdes**, **Edmon Perkins**, *Auburn University, Auburn, AL, United States*

140. New Mixed Scheme for Rotor Blade Structural Load Calculation

Poster Presentation. IMECE2018-88916

Jie Wu, *Jiangsu University of Science & Technology, Zhenjiang, China*

141. Payload Design for Orbital Structural Health Monitoring Experiments

Poster Presentation. IMECE2018-89430

Arjun Tandon, **Daniel Pacheco**, **Shane McKinney**, **Michael Underwood**, **Carl Bancroft**, **Douglas MacNinch**, **John Sanchez**, **Andrei Zagrai**, *New Mexico Institute of Mining and Technology, Socorro, NM, United States*

142. Bio-Inspired High Aerodynamic Tail for Robot Reorientation and Stabilization

Poster Presentation. IMECE2018-89710

Cameron Selby, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Amir Patel**, *Johns Hopkins University, Baltimore, MD, United States*, **Peter Li**, **Aaron Johnson**, *Carnegie Mellon University, Pittsburgh, PA, United States*

143. Spring Mass Model Control for 3D Dynamic Running on the ATRIAS Biped

Poster Presentation. IMECE2018-89782

Lin Song, **William Martin**, **Hartmut Geyer**, *Carnegie Mellon University, Pittsburgh, PA, United States*

16-7 ENGINEERING EDUCATION

16-7-1 Engineering Education

11:45am–2:30pm

144. Design and Control of a High Precision Laser-Cutting Machine

Poster Paper Publication. IMECE2018-88131

Mason Van Bibber, **Behnam Bahr**, *California State Polytechnic University, Pomona, CA, United States*

145. Experience of Multiple Instructors About Student Presentation Based Teaching (SPET) Approach

Poster Paper Publication. IMECE2018-88410

Pawan Tyagi, **Morris Thomas**, **Carl Moore**, **Pamela Hampton-Garland**, **Jiajun Xu**, **Lara Thompson**, **Sasan Haghani**, *University of the District of Columbia, Washington, DC, United States*

146. Student Presentation Based Teaching (SPET) Approach for Classes With Higher Enrollment

Poster Paper Publication. IMECE2018-88463

Pawan Tyagi, *University of the District of Columbia, Washington, DC, United States*

147. A Portable Laboratory for Dynamic Systems and Controls

Poster Presentation. IMECE2018-89494

Xiaorui Li, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Mark Bedillion**, *Carnegie Mellon University, Gibsonia, PA, United States*

148. Use of Advanced Manufacturing for Better Tooling Performance in the Capstone Experience

Poster Presentation. IMECE2018-89729

Hazel Marie, *Youngstown State University, Boardman, OH, United States*, **Stefan Moldovan**, *Youngstown State University, Youngstown, OH, United States*

16-8 ENERGY

16-8-1 Energy

11:45am–2:30pm

149. Optimization of Hot Side Housing Component for a Rotary Displacer Stirling Engine

Poster Presentation. IMECE2018-87981

William C. Mullins, **Amirhossein Bagheri**, **Phillip R. Foster**, **Huseyin Bostanci**, *University of North Texas, Denton, TX, United States*

150. Conductive Heating of Li-Ion Batteries at Low Temperatures

Poster Paper Publication. IMECE2018-88235

Zhibang Xu, **Meng Xu**, **Xia Wang**, **Peng Zhao**, *Oakland University, Rochester Hills, MI, United States*

151. Development of a Self-Sustaining Water Distillation System Using Activated Carbon Nanofluids

Poster Presentation. IMECE2018-88756

Ashreet Mishra, *Purdue University Northwest, Hammond, IN, United States*, A.G. Agwu Nnanna, *University of Texas of the Permian Basin, Odessa, TX, United States***152. Rack Level Cooling of a Dynamic Cold Plate Using Self Regulating Flow Control Device**

Poster Presentation. IMECE2018-88832

Amrutha Rachakonda, Rajesh Kasukurthy, Dereje Agonafer, *University of Texas at Arlington, Arlington, TX, United States***153. Influence of the Tilt Angle of All-Glass Vacuum Tube Collectors on the Thermal Performance of Tube Solar Water Heaters**

Poster Presentation. IMECE2018-88985

Elder Mendoza, *Universidad Nacional de Trujillo, Trujillo, Peru***154. Performance Improvement of Cathode Electrodes in Lithium Ion Batteries by Nanoscale Surface Engineering via Chemical Vapor Deposition Polymerization**

Poster Presentation. IMECE2018-89113

Laisuo Su, Phil M. Smith, B. Reeja-Jayan, *Carnegie Mellon University, Pittsburgh, PA, United States***155. Numerical and Experimental Investigation of Effects of Metal Foam on the Melting of PCM Inside a Horizontal Cylinder**

Poster Presentation. IMECE2018-89114

Saurabh Mali, Subrata Sengupta, Suvil C. Kundapur, Abhishek Mangoli, *University of Michigan Dearborn, Dearborn, MI, United States***156. Practical Benefit Analysis of Heat Recovery for Multi-Stage Air Compressors**

Poster Presentation. IMECE2018-89160

Yiming Ma, Yi Chu, *FS-Elliott CN Co., Shanghai, China*, Rongxin Zhang, Brad Hayes, *FS-Elliott LLC, Export, PA, United States*, Xuyang Chi, *FS-Elliott CN Co., Shanghai, Shanghai, China***157. A Novel Method to Store Thermal Energy in a BTES System**

Poster Presentation. IMECE2018-89275

Seung Joo Lee, Sarng Woo Karng, Jinsoo Park, *Korea Institute of Science and Technology, Seoungbook-gu, Seoul, Korea (Republic)*, Sungho Choi, *Syngkyunkwan University, Suwon, Korea (Republic)***158. Analysis of Cytochrome C Oxidase Oxygen Reduction Reaction to Develop a Catalyst for Hydrogen Fuel Cells**

Poster Presentation. IMECE2018-89333

Rudy Torres, Philip R. LeDuc, *Carnegie Mellon University, Pittsburgh, PA, United States***159. New Decal Transfer Method for the Fabrication of PGM-Free Polymer Electrolyte Fuel Cell**

Poster Presentation. IMECE2018-89375

Yuqi Guo, Leiming Hu, Aman Uddin, *Carnegie Mellon University, Pittsburgh, PA, United States*, Hanguang Zhang, Gang Wu, *University at Buffalo, State University of New York, Buffalo, NY, United States*, Shawn Litster, *Carnegie Mellon University, Pittsburgh, PA, United States***160. Influence of Ionomer on Platinum Group Metal-Free Catalyst Activity as Evaluated by Rotating Disk Electrode Measurements**

Poster Presentation. IMECE2018-89422

Xiaomin Xu, Aman Uddin, Jonathan Braaten, *Carnegie Mellon University, Pittsburgh, PA, United States*, Hanguang Zhang, Gang Wu, *University at Buffalo, State University of New York, Buffalo, NY, United States*, Shawn Litster, *Carnegie Mellon University, Pittsburgh, PA, United States***161. In-Operando Imaging of Copper Dendrites Growth Based on Planar Micro-cell Using Ultra-High Resolution X-ray Computed Tomography**

Poster Presentation. IMECE2018-89462

Hanwei Zhou, Tianwen Chen, Paul Choi, Bharathy Parimalam, Yubai Li, Shawn Litster, *Carnegie Mellon University, Pittsburgh, PA, United States***162. Design of a Borehole Thermal Energy Storage System**

Poster Presentation. IMECE2018-89474

Sarng Woo Karng, Jinsoo Park, Seung Joo Lee, *Korea Institute of Science and Technology, Seoul, Seoul, Korea (Republic)***163. CFD Study of the Dual Vertical Axis Wind Turbine**

Poster Presentation. IMECE2018-89571

Shreyas P. Shetty, *Manipal Academy of Higher Education, Hyderabad, Telangana, India***164. Carbon-Based Nanomaterials for Surface Properties and Energy Storage**

Poster Presentation. IMECE2018-89573

Ziyu Zhou, Tongchuan Gao, Paul Leu, *University of Pittsburgh, Pittsburgh, PA, United States***165. Hardware and Software Development for Telemetry-Intensive Solar Forecasting**

Poster Presentation. IMECE2018-89846

Hugo T.C. Pedro, David Larson, Jeremy Orosco, *University of California San Diego, La Jolla, CA, United States*, Carlos Coimbra, *University of California, San Diego, San Diego, CA, United States***166. Direct Spectral Estimation of Cloud Optical Properties From GOES-R Imagery**

Poster Presentation. IMECE2018-89853

David Larson, Mengying Li, Hugo T.C. Pedro, *University of California, San Diego, La Jolla, CA, United States*, Carlos Coimbra, *University of California, San Diego, San Diego, CA, United States*

167. Transition Metal Dichalcogenides (TMDs) for Application as Supercapacitor Electrodes
 Poster Presentation. IMECE2018-89877
 Kenneth Mcloud, Jonathan Turnley, Santanu Mukherjee, Zhongkan Ren, Gurpreet Singh, *Kansas State University, Manhattan, KS, United States*

168. Optimization of Nano-Texturing Parameters to Maximize the Light Trapping of Thin Film Solar Cells
 Poster Presentation. IMECE2018-90019
 Ola Rashwan, *Pennsylvania State University, Middletown, PA, United States*, Nur Khairina Khairu Najhan, Andrew Newill, *Pennsylvania State - Harrisburg, Middletown, PA, United States*

16-9 FLUIDS ENGINEERING

16-9-1 Fluids Engineering

11:45am–2:30pm

169. Modeling and Simulation of Laser Fabrication of Microfluidic Channels
 Poster Presentation. IMECE2018-86951
 Mohammad Hossan, Matthew Benton, Haley Allen, Abdallah Ait Moussa, *University of Central Oklahoma, Edmond, OK, United States*

170. Experimental Facility Design for Air-Water Two Phase Flow Phenomena Measurement in Research Reactor Cooling System
 Poster Presentation. IMECE2018-87308
 Ki-Jung Park, Minkyu Jung, Kyoungwoo Seo, Seong Hoon Kim, *Korea Atomic Energy Research Institute, Daejeon, Korea (Republic)*

171. Numerical Examination of Jets Induced by Multi-Bubble Interactions
 Poster Paper Publication. IMECE2018-87606
 Joydip Mondal, Arpit Mishra, Rajaram Lakkaraju, Parthasarathi Ghosh, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

172. Proper Orthogonal Decomposition Applied to a Convergent Shock Wave Dynamically Interacting With a Cylindrical Density Interface
 Poster Presentation. IMECE2018-88175
 Erik Proano, Dongeun Seo, Bertrand Rollin, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

173. Droplet Nucleation and Growth in Cryogenic Turboexpanders
 Poster Paper Publication. IMECE2018-88343
 Ashish Alex Sam, Keerthi Raj Kunniyoor, Jayachandran K.N., Arpit Mishra, Parthasarathi Ghosh, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

174. Numerical Analysis of Heat Transfer and Fluid Flow in Micro-Welding Using CFD
 Poster Paper Publication. IMECE2018-86363
 Divyaj Shah, *Indian Institute of Technology, Bombay, Pune, Maharashtra, India*, Chandrashekhar M. Sewatkar, *College of Engineering, Pune, Pune, Maharashtra, India*, Ketaki Godbole, *Bajaj Auto Ltd., Pune, Pune, Maharashtra, India*

16-10 HEAT TRANSFER AND THERMAL ENGINEERING

16-10-1 Heat Transfer and Thermal Engineering

11:45am–2:30pm

175. Realization of Energy-Saving Glass Using Photonic Crystals
 Poster Presentation. IMECE2018-86185
 Yen-Hsiang Chen, Yu-bin Chen, *National Tsing Hua University, Hsinchu City, Taiwan*

176. Experimental Studies of Enhanced Tubes for Flooded Evaporator Using R-1233zd(E) Refrigerant
 Poster Presentation. IMECE2018-86265
 Ho Won Byun, Dong Ho Kim, Seok Ho Yoon, Chan Ho Song, Kong Hoon Lee, Ook Joong Kim, *Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

177. Numerical and Experimental Investigations of Combustion and NO_x Emission Characteristics of a 330MW Utility Boiler With Swirl Burners
 Poster Presentation. IMECE2018-86777
 Wenhua Liu, Mo Yang, *University of Shanghai for Science and Technology, Shanghai, China*, Yuwen Zhang, Zheng Li, *University of Missouri, Columbia, MO, United States*, Hong Jin, Wenshuai Wang, *University of Shanghai for Science and Technology, Shanghai, China*

178. Quantifying Uncertainty in First-Principles Predictions of Phonon Dispersion Relations
 Poster Presentation. IMECE2018-87933
 Holden Parks, Venkat Viswanathan, Alan McGaughey, *Carnegie Mellon University, Pittsburgh, PA, United States*

179. Visualization of Nanoengineered Coating Longevity During Condensation
 Poster Presentation. IMECE2018-88077
 Muhammad Jahidul Hoque, Longnan Li, Nenad Miljkovic, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

180. Individual Phonon Branch Contribution to Thermal Conductivity of 3C-SiC Using the Monte Carlo Method
 Poster Paper Publication. IMECE2018-88083
 Arden Barnes, Nicholas Roberts, *Utah State University, Logan, UT, United States*

181. Flow and Heat Transfer of Mist/Steam Two-Phase Flow in Two-Pass Rectangular Channels With Paralleled and V-Shaped Rib Turbulators

Poster Paper Publication. IMECE2018-88532

Guangwen Jiang, Jianmin Gao, Xiaojun Shi, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Zhao Wang, Yunlong Li, State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, Xi'an, China

182. Experimental Investigation of an R134a Loop Thermosiphon for Shaft Cooling

Poster Paper Publication. IMECE2018-88548

Fajing Li, Jianmin Gao, Xi'an Jiaotong University, Xi'an, Shanxi, China, Liang Xu, State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Feng Liang, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Guangwei Jiang, State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China

183. Investigation of Cure process of Carbon Epoxy Composite Block

Poster Presentation. IMECE2018-88758

Kibum Kim, JinSang Yoon, Chungbuk National University, Cheongju, Korea (Republic)

184. Total Variation Regularization for Temperature Field Reconstruction Based on the Light-Field Imaging Technique

Poster Presentation. IMECE2018-88786

Xing Huang, Hong Qi, Xiang-Yang An, Li-Ming Ruan, Harbin Institute of Technology, Harbin, China

185. The Origin of Hydrophilic Surface Functionalization-Induced Thermal Conductance Enhancement Across Solid-Water Interfaces

Poster Presentation. IMECE2018-89075

Dezhao Huang, Ruimin Ma, University of Notre Dame, South Bend, IN, United States, Teng Zhang, Schrodinger Inc., New York, NY, United States, Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States

186. Thermal Transport of Fullerene-Based Superatomic Crystals Controlled by Orientational Disorder

Poster Presentation. IMECE2018-89253

Matthew Bartnof, Alexander D. Christodoulides, Carnegie Mellon University, Pittsburgh, PA, United States, Wee-Liat Ong, Zhejiang University, Haining, Zhejiang, China, Evan O'Brien, Xavier Roy, Columbia University, New York, NY, United States, Alan McGaughey, Jonathan Malen, Carnegie Mellon University, Pittsburgh, PA, United States

187. The Effect of Adhesion Layer on the Thermal Boundary Conductance

Poster Presentation. IMECE2018-89406

Kiumars Aryana, Rouzbeh Rastgar, David Olson, John Gaskins, Ashutosh Giri, Pamela M. Norris, Patrick E. Hopkins, University of Virginia, Charlottesville, VA, United States

188. Nanoscale to Megascale Thermal Engineering: A Path to Sustainable Energy

Poster Presentation. IMECE2018-89715

Bikram Bhatia, Massachusetts Institute of Technology, Cambridge, MA, United States

189. Metal Sulfides for Thermochemical Energy Storage

Poster Presentation. IMECE2018-89779

Gwendolyn Wang, University of California, San Diego, San Diego, CA, United States

190. Heterogeneous Monolayer Wick Structures for High Heat Flux Thermal Management Systems

Poster Presentation. IMECE2018-89957

Nathan Albu, Athul J. Pai, Gisuk Hwang, Wichita State University, Wichita, KS, United States

191. Enhanced Flow Boiling Using Columnar-Post Wick

Poster Presentation. IMECE2018-89971

Athul J. Pai, Yahya Naserharifi, Gisuk Hwang, Wichita State University, Wichita, KS, United States

192. Advanced Passive Thermal Management of Li-Ion Batteries Operating at Various Environmental Temperatures

Poster Presentation. IMECE2018-89999

Derek Barnes, Xianglin Li, University of Kansas, Lawrence, KS, United States

16-11 MATERIALS: GENETICS TO STRUCTURES**16-11-1 Materials: Genetics to Structures**

11:45am–2:30pm

193. Metal-Organic-Frameworks as Efficient Electrocatalysts for Oxygen Evolution Reaction: Insights Into the Active Centers

Poster Presentation. IMECE2018-86176

Chun-Yu Lin, University of North Texas, Denton, TX, United States, Shuangyin Wang, Hunan University, Changsha, China, Zhenhai Xia, University of North Texas, Denton, TX, United States

194. Molecular Dynamics Simulation for Dislocation on Lead Titanate Films

Poster Presentation. IMECE2018-86882

Cooper Gray, Razak Adeniji, Zhi Wang, University of St. Thomas, St. Paul, MN, United States, Jeong Ho You, University of St. Thomas, Woodbury, MN, United States

195. First-Principle Investigation of Structural, Elastic, Electronic and Thermal Properties of Dysprosium Hafnate Oxides

Poster Paper Publication. IMECE2018-87099

Hui Niu, Ansys Inc., Canonsburg, PA, United States

196. Effect of Nano Silica on Compressive Strength of Concrete

Poster Paper Publication. IMECE2018-87799

Waleed Ahmed, *United Arab Emirates University, Al Ain, United Arab Emir.*, Wail Al-Rifaie, Abdalmjeed Alawaneh, Mohammed Al-Bajawi, *Philadelphia University, Amman, Jordan*

197. Study of Buckling of Plate Under Shear Compared Under Compression Results

Poster Presentation. IMECE2018-87986

Sadek Salem Cherif, *University of Sciences and Technology of Oran Mohamed Boudiaf, Tizi-Ouzou, Algeria*

198. Effect of Stress Triaxiality on Creep Deformation and Damage in Mod.9Cr-1Mo Steel

Poster Presentation. IMECE2018-88957

Katsutaka Yamada, *Chiba Institute of Technology, Funabashi, Chiba, Japan*, Takashi Ogata, *Chiba Institute of Technology, Chiba, Japan*

199. Creep Strength Evaluation of Long-Term Used Welded Joint on Mod.9Cr-1Mo Steel by Using a Miniature Specimen

Poster Presentation. IMECE2018-89002

Hiroki Yamazaki, *Chiba Institute of Technology, Narashino, Japan*, Takashi Ogata, *Chiba Institute of Technology, Chiba, Japan*

200. Investigation of Mechanical Strength of Gallium Based Alloys

Poster Presentation. IMECE2018-89094

Courtney Titus, Stephen P. Stagon, *University of North Florida, Jacksonville, FL, United States*

201. Crack Paths in Anisotropic Biomimetic Composites Textured by Magnetic Nanoparticles

Poster Presentation. IMECE2018-89964

Chunzhou Pan, Ata Mesgarnejad, Sandra Shefelbine, Alain Karma, Randall Erb, *Northeastern University, Boston, MA, United States*

16-12 MECHANICS OF SOLIDS, STRUCTURES AND FLUIDS

16-12-1 Mechanics of Solids, Structures and Fluids

11:45am–2:30pm

202. Experimental Investigation on Dynamic Fracture Behavior of 5A06 Aluminum Alloy

Poster Presentation. IMECE2018-88879

Peng Ren, *Jiangsu University of Science & Technology, Zhenjiang, China*

203. Development of a Moving Window Molecular Dynamics Framework to Model Shock Wave Interaction at Microstructural Features

Poster Presentation. IMECE2018-89306

Alexander Davis, Vinamra Agrawal, *Auburn University, Auburn, AL, United States*

204. Mesoscopic Modelling of Carbon Nanotube Thin Films With Covalent Cross-Links

Poster Presentation. IMECE2018-89373

Md. Abu Horaira Banna, Alexey Volkov, *University of Alabama, Tuscaloosa, AL, United States*

205. Modifying the Mechanical Response of a Cold Drawing Polymer Film by the Addition of a Perfectly Bonded Hyperelastic Layer

Poster Presentation. IMECE2018-89377

Rahul Gopalan Ramachandran, Hariharakrishnan S., Steven D. Abramowitch, Spandan Maiti, Sachin S. Velankar, *University of Pittsburgh, Pittsburgh, PA, United States*

206. Simple Model for Tool Interaction on a Continuously Deformable Environment

Poster Presentation. IMECE2018-89452

Wooshik Kim, Aaron Johnson, *Carnegie Mellon University, Pittsburgh, PA, United States*

207. Computational Modeling of Electrically Actuated Shape Memory Polymers

Poster Presentation. IMECE2018-89927

Midhan Siwakoti, Russell Mailen, *Auburn University, Auburn, AL, United States*

16-13 SOCIETY-WIDE MICRO AND NANOTECHNOLOGY FORUM

16-13-1 Society-Wide Micro and Nanotechnology Forum

11:45am–2:30pm

208. Systematic Analysis of Pattern Precision and Uniformity in Roll-to-Roll Colloidal Assembly System

Poster Presentation. IMECE2018-88840

I-Te Chen, Elizabeth Schappell, Xiaolong Zhang, Chih-Hao Chang, *North Carolina State University, Raleigh, NC, United States*

209. Tensile Properties of P3HT:PCBM Bulk-heterojunction Thin Films by Coarse-Grained Molecular Dynamics

Poster Presentation. IMECE2018-88872

Joydeep Munshi, Ganesh Balasubramanian, *Lehigh University, Bethlehem, PA, United States*

210. Role of Processing on the Morphology of P3HT:PCBM Bulk-Heterojunction Thin Films by Coarse-grained Molecular Simulations

Poster Presentation. IMECE2018-88873

Joydeep Munshi, *Lehigh University, Bethlehem, PA, United States*, Umar Farooq Ghumman, Akshay Iyer, *Northwestern University, Evanston, IL, United States*, Rabindra Dulal, *University of Wyoming, Laramie, WY, United States*, Wei Chen, *Northwestern University, Evanston, IL, United States*, TeYu Chien, *University of Wyoming, Laramie, WY, United States*, Ganesh Balasubramanian, *Lehigh University, Bethlehem, PA, United States*

211. Role of Polydispersity on the Morphology of P3HT:PCBM Organic Solar Cells by Coarse-Grained Molecular Simulations

Poster Presentation. IMECE2018-88874

Joydeep Munshi, *Lehigh University, Bethlehem, PA, United States*, Umar Farooq Ghumman, Akshay Iyer, *Northwestern University, Evanston, IL, United States*, Rabindra Dulal, *University of Wyoming, Laramie, WY, United States*, Wei Chen, *Northwestern University, Evanston, IL, United States*, TeYu Chien, *University of Wyoming, Laramie, WY, United States*, Ganesh Balasubramanian, *Lehigh University, Bethlehem, PA, United States*

212. Large-Scale Dynamic Energy Driven Assembly of Two-Dimensional Layered Materials on Polymer Substrate

Poster Presentation. IMECE2018-88882

Dong Zhou, Bo Li, *Villanova University, Villanova, PA, United States*

213. Magnetically Actuated Dynamic Iridescence Inspired by the Neon Tetra

Poster Presentation. IMECE2018-88898

Zhiren Luo, *North Carolina State University, Raleigh, NC, United States*, Benjamin Evans, *Elon University, Elon, NC, United States*, Chih-Hao Chang, *North Carolina State University, Raleigh, NC, United States*

214. The Stability and Diffusion of Lithium Affected by a 60° Shuffle Dislocation in Silicon

Poster Presentation. IMECE2018-88923

Wei Zhao, *Jiangsu University of Science and Technology, Zhen Jiang, China*

215. Heat Transfer Across 3C-SiC-Water Interfaces: Solid-Liquid Affinity, Interfacial Structuring, and Spectral Characteristics

Poster Presentation. IMECE2018-88943

C. Ulises Gonzalez-Valle, *Pennsylvania State University, State College, PA, United States*, Bladimir Ramos, *Pennsylvania State University, University Park, PA, United States*

216. Determining Influential Descriptors for Polymer Chain Conformation Based on Empirical Force-Fields and Molecular Dynamics Simulations

Poster Presentation. IMECE2018-88958

Ruimin Ma, *University of Notre Dame, South Bend, IN, United States*, Tengfei Luo, *University of Notre Dame, Notre Dame, IN, United States*

217. Multiscale Modeling of PEEK Using Reactive Molecular Dynamics Modeling and Micromechanics

Poster Presentation. IMECE2018-88967

Will Pisani, Matthew Radue, *Michigan Technological University, Houghton, MI, United States*, Sorayot Chinkanjanarot, *National Metals and Materials Technology Center, Khlong Nueng, Pathum Thani, Thailand*, Brett A. Bednarczyk, Evan Pineda, *NASA Glenn Research Center, Cleveland, OH, United States*, Kevin Waters, Ravindra Pandey, Julie King, Gregory Odegard, *Michigan Technological University, Houghton, MI, United States*

218. Demonstration of the Magnetic Polaritons in Deep AI Gratings in Off-Plane Layout

Technical Presentation. IMECE2018-88977

Peiyan Yang, Zhuomin Zhang, *Georgia Institute of Technology, Atlanta, GA, United States*, Hong Ye, *University of Science and Technology of China, Hefei, China*

219. Achieving Low Lattice Thermal Conductivity by Stereochemically Activating Lone-Pair Electrons: A Case Study of Boron Arsenide

Technical Presentation. IMECE2018-89003

Guangzhao Qin, *University of South Carolina, Columbia, SC, United States*, Zhenzhen Qin, *Zhengzhou University, Zhengzhou, Henan, China*, Huimin Wang, *Northeastern University, Shenyang, Liaoning, China*, Ming Hu, *University of South Carolina, Columbia, SC, United States*

220. External Electric Field Driving the Ultra-Low Thermal Conductivity of Silicene

Technical Presentation. IMECE2018-89004

Guangzhao Qin, Ming Hu, *University of South Carolina, Columbia, SC, United States*

221. A Modified Theoretical Model to Accurately Account for Interfacial Roughness in Predicting the Interfacial Thermal Conductance

Poster Presentation. IMECE2018-89040

Yingying Zhang, *University of Minnesota, St. Paul, MN, United States*, Dengke Ma, Yi Zang, *Huazhong University of Science and Technology, Wuhan, China*, Xiaojia Wang, *University of Minnesota, Minneapolis, MN, United States*, Nuo Yang, *Huazhong University of Science and Technology, Wuhan, Hubei, China*

222. Thermal Transport in ZnO Nanocrystal Networks Synthesized by Nonthermal Plasma

Poster Presentation. IMECE2018-89041

Xuewang Wu, Ben Greenberg, *University of Minnesota, Minneapolis, MN, United States*, Yingying Zhang, *University of Minnesota, St. Paul, MN, United States*, Uwe Kortshagen, James Kakalios, Eray S. Aydil, Xiaojia Wang, *University of Minnesota, Minneapolis, MN, United States*

223. Enhancing Light Transmission in Nacre-Inspired Multilayer Composites Using Interfacial Nanostructures

Poster Presentation. IMECE2018-89093

Yi-An Chen, Chih-Hao Chang, *North Carolina State University, Raleigh, NC, United States*, Sharan/S.V. Naidu, *GlobalFoundries, Raleigh, NC, United States*, Zhiren Luo, *North Carolina State University, Raleigh, NC, United States*

224. Failure Prediction Using Gibbs Formulation of Granular Micromechanics

Poster Presentation. IMECE2018-89208

Anil Misra, Rizacan Sarikaya, *University of Kansas, Lawrence, KS, United States*, Payam Poorsolhjoui, *Purdue University, West Lafayette, IN, United States*

225. Tunable Near-Field Radiative Heat Transfer by Electrically Gating Monolayer Graphene

Poster Presentation. IMECE2018-89214

Xiaoyan Ying, Liping Wang, *Arizona State University, Tempe, AZ, United States*

226. Thermochromic VO₂-Based Variable Emittance Coatings for Spacecraft Thermal Control

Poster Presentation. IMECE2018-89217

Sydney Taylor, Liping Wang, *Arizona State University, Tempe, AZ, United States*

227. Combined Effects of Liquid Wicking and Hydrodynamic Instability on Pool Boiling Critical Heat Flux by Two-Tier Structures of Nanowires and Microgrooves

Poster Presentation. IMECE2018-89226

Guanglei Chen, Calvin Hong Li, *Villanova University, Villanova, PA, United States*

228. Local Measurement of the Evaporative Heat Transfer Coefficient in Thin Films Using Frequency Domain Thermoreflectance

Poster Presentation. IMECE2018-89250

Xiaoman Wang, Xiaoyue Zhao, Alan McGaughey, Jonathan Malen, *Carnegie Mellon University, Pittsburgh, PA, United States*

229. Synthesis and Characterization of Electrodeposited Ni-Co Core-Shell Nanowires

Poster Presentation. IMECE2018-89321

Ali Shiave, *University of North Carolina at Greensboro, Greensboro, NC, United States*, Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

230. Additive Manufacturing of Multi-Material Micro Structural Features—Comparison of Print Part Quality and Characteristics From Voxel and Stereolithography Digital Designs

Poster Presentation. IMECE2018-89332

Furkan Ulu, Ravi Pratap Singh Tomar, Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

231. Additive Manufacturing Aids the Verification of Granular Micromechanics Model

Poster Presentation. IMECE2018-89340

Nima Nejadsadeghi, Anil Misra, *University of Kansas, Lawrence, KS, United States*

232. Tunable Granular Metamaterials Based Upon Wave Propagation Analysis Using Granular Micromechanics

Poster Presentation. IMECE2018-89342

Nima Nejadsadeghi, Anil Misra, *University of Kansas, Lawrence, KS, United States*

233. Experimental Measurement of the Spectrum of Near-Field Thermal Emission

Poster Presentation. IMECE2018-89369

Saman Zare, Carl Tripp, Sheila Edalatpour, *University of Maine, Orono, ME, United States*

234. Wavevector and Polarization Resolved Analysis of Phonon Scattering From Embedded Nanoparticles

Technical Presentation. IMECE2018-89410

Rohit Kakodkar, Joseph P. Feser, *University of Delaware, Newark, DE, United States*

235. Thermal Transport Across Gallium Oxide/Metal Interfaces

Poster Presentation. IMECE2018-89509

Henry Aller, Alan McGaughey, Jonathan Malen, Andrew Gellman, Xiaoxiao Yu, *Carnegie Mellon University, Pittsburgh, PA, United States*

236. Microfluidics to Study Multiscale Porosity

Poster Presentation. IMECE2018-89559

Mohammad Mehdi Salek, *ETH Zurich, Zurich, Switzerland*, Jiande Zhou, *EPFL, Lausanne, Switzerland*, Roman Stocker, Joaquin Jimenez-Martinez, *ETH Zurich, Zurich, Switzerland*

237. Mechanical and Electrostatic Properties of Synthetic Collagen Molecules via Molecular Dynamics Modeling

Poster Presentation. IMECE2018-89568

Atul Rawal, Kristen Rhinehardt, Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

238. Laser-Induced Surface Treatment of PMMA for Capillary Driven Flows

Poster Presentation. IMECE2018-89601

Md. Shamim Mahmud, Bahador Farshchian, *Texas State University, San Marcos, TX, United States*, Hakjin Kim, *Convert, Chuncheon, Korea (Republic)*, Hyunghoon Kim, *Boditech Med, Chuncheon, Korea (Republic)*, Heonyoung Kim, *Kangwon National University, Chuncheon, Korea (Republic)*, Namwon Kim, *Texas State University, San Marcos, TX, United States*

239. Mechanical Behavior of Cement Paste at Nanoscale—Experimental Characterization and Reactive Molecular Dynamics Modeling

Poster Presentation. IMECE2018-89606

Ingrid Padilla Espinosa, Ram Mohan, *North Carolina A&T University, Greensboro, NC, United States*

240. Suspended Thermo-Reflectance Measurements of the Thermal Properties of Silicon Micro- and Nano-Cantilever Beams

Poster Presentation. IMECE2018-89657

Dipta Sarkar, Zayd Leseman, *Kansas State University, Manhattan, KS, United States*

241. Deformable Shallow Microfluidics: Fluid Flow Rectification and Novel Particle Manipulation Platform

Poster Presentation. IMECE2018-89661

Aryan Mehboudi, Junghoon Yeom, *Michigan State University, East Lansing, MI, United States*

242. Tailoring the Property of Nanocomposites Using Nickel Coated Carbon Nanotube and magnetic Field

Poster Presentation. IMECE2018-89678

Ahmed M. Abdalla, Rakesh Sahu, Ishwar K. Puri, *McMaster University, Hamilton, ON, Canada*

243. In Situ Contactless 3D Printing of Cellular Structures

Poster Presentation. IMECE2018-89701

Sarah Mishriki, Abdel Rahman Abdel Fattah, Elvira Meleca, McMaster University, Hamilton, ON, Canada, Tobias Kammann, Friedrich Schiller University Jena, Jena, Germany, Rakesh Sahu, Fei Geng, Ishwar K. Puri, McMaster University, Hamilton, ON, Canada

244. Magnetic Antibody Functionalized Carbon Nanotube Ink for Rapid Printing of Biosensors

Poster Presentation. IMECE2018-89703

Sarah Mishriki, Abdel Rahman Abdel Fattah, Ahmed M. Abdalla, Elvira Meleca, Fei Geng, Suvojit Ghosh, Ishwar K. Puri, McMaster University, Hamilton, ON, Canada

245. Energy Efficient Metal Mesh Fog Filters to Simultaneously Harness Atmospheric Fog-Water and Remove VOCs

Poster Presentation. IMECE2018-89736

Ritwick Ghosh, Rakesh Sahu, Igor Zhitomirsky, McMaster University, Hamilton, ON, Canada, Ranjan Ganguly, Jadavpur University, Kolkata, West Bengal, India, Ishwar K. Puri, McMaster University, Hamilton, ON, Canada

246. Spatial Mapping and Analysis of Thermal Boundary Conductance of Metal–MoSe₂ Interfaces Using Time-Domain Thermoreflectance

Poster Presentation. IMECE2018-89754

David B. Brown, Georgia Institute of Technology, Atlanta, GA, United States, Xufan Li, Kai Xiao, David B. Geohegan, Oak Ridge National Laboratory, Oak Ridge, TN, United States, Satish Kumar, Georgia Institute of Technology, Atlanta, GA, United States

247. Hundred-Fold Enhancement in Far-Field Radiative Heat Transfer Over the Blackbody Limit

Poster Presentation. IMECE2018-89796

Dakotah Thompson, Linxiao Zhu, Rohith Mittapally, Seid Sadat, University of Michigan, Ann Arbor, MI, United States, Zhen Xing, Patrick McArdle, Mumtaz Qazilbash, College of William and Mary, Williamsburg, VA, United States, Pramod Sangi Reddy, Edgar Meyhofer, University of Michigan, Ann Arbor, MI, United States

248. Advanced FeOOH-MWCNTS Composite Negative Electrodes With High Areal Capacitance for Asymmetric Supercapacitors

Poster Presentation. IMECE2018-89817

Ri Chen, Rakesh Sahu, Igor Zhitomirsky, Ishwar K. Puri, McMaster University, Hamilton, ON, Canada

249. Conversion of Heat to Electricity Using a Nano Gap Near-Field Thermophotovoltaic Device

Poster Presentation. IMECE2018-89852

Linxiao Zhu, Anthony Fiorino, Dakotah Thompson, Rohith Mittapally, Pramod Sangi Reddy, Edgar Meyhofer, University of Michigan, Ann Arbor, MI, United States

250. Transient Thermoreflectance Techniques for Measuring Thermal Conductivity

Poster Presentation. IMECE2018-89886

Jihoon Jeong, Yaguo Wang, University of Texas at Austin, Austin, TX, United States

251. Comparison of Friction in Graphene Wrapped Nanodiamond and Graphitized Nanodiamond

Poster Presentation. IMECE2018-89914

Srilok Srinivasan, Iowa State University, Ames, IA, United States, Diana Berman, University of North Texas, Denton, TX, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Subramanian K.R.S. Sankaranarayanan, Argonne National Laboratory, Lemont, IL, United States, Ali Erdemir, Argonne National Laboratory, Argonne, IL, United States, Anirudha Sumant, Argonne National Laboratory, Lemont, IL, United States

252. Thermal Conductivity of Ga Doped Crystalline Si Using Molecular Dynamics

Poster Presentation. IMECE2018-89939

Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Zayd Leseman, Kansas State University, Manhattan, KS, United States

253. Atomistic Modeling of Wetting and Evaporation on Nanostructured Printed Graphene

Poster Presentation. IMECE2018-89963

Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Suprem Das, Kansas State University, Manhattan, KS, United States

254. Heat Transport Mechanism in 2D Hybrid Perovskite

Poster Presentation. IMECE2018-89972

Md. Abu Jafar Rasel, Joseph P. Feser, University of Delaware, Newark, DE, United States

16-14 BEST STUDENT POSTER COMPETITION ON COMPUTATIONAL MECHANICS**16-14-1 Best Student Poster Competition on Computational Mechanics**

11:45am–2:30pm

255. Peridynamic Modeling of Intergranular Corrosion Damage

Poster Presentation. IMECE2018-86735

Siavash Jafarzadeh, University of Nebraska–Lincoln, Lincoln, NE, United States, Ziguang Chen, Huazhong University of Science and Technology, Wuhan, Hubei, China, Florin Bobaru, University of Nebraska–Lincoln, Lincoln, NE, United States

256. Dynamic Fracture at an Interface: A Peridynamic

Analysis

Poster Presentation. IMECE2018-86936

Javad Mehrmashhadi, Quang Le, Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

257. Sharp Volumetric Billboard Based Multilevel Multigrid Method

Poster Presentation. IMECE2018-88073

Dewen Yushu, Karel Matouš, *University of Notre Dame, Notre Dame, IN, United States*

258. Peridynamic Modelling of Crack Nucleation

Poster Presentation. IMECE2018-88164

Sina Niazi, Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

259. The Peridynamic Coupling of Fracture, Diffusion, and Corrosion

Poster Presentation. IMECE2018-88218

Jiangming Zhao, Siavash Jafarzadeh, *University of Nebraska–Lincoln, Lincoln, NE, United States*, Ziguang Chen, *Huazhong University of Science and Technology, Wuhan, Hubei, China*, Florin Bobaru, *University of Nebraska–Lincoln, Lincoln, NE, United States*

260. Multiresolution Modeling and Error Control With an Adaptive Wavelet Algorithm

Poster Presentation. IMECE2018-88289

Cale Harnish, Karel Matouš, *University of Notre Dame, Notre Dame, IN, United States*, Daniel Livescu, *Los Alamos National Lab, Los Alamos, NM, United States*

261. Impact Induce Behavior of HTPB/HMX Based Energetic Materials Using Cohesive Finite Element Method

Poster Presentation. IMECE2018-88950

Ayotomi Olokun, Chandra Prakash, Ibrahim Gunduz, Vikas Tomar, *Purdue University, West Lafayette, IN, United States*

262. Lone-Pair Electrons Lead to Strong Phonon Anharmonicity and Anomalous Strain Enhancement of Thermal Conductivity

Poster Presentation. IMECE2018-89005

Guangzhao Qin, Ming Hu, *University of South Carolina, Columbia, SC, United States*

263. Multiscale Fracture Simulation Based on Coupled Space-Time Finite Element Method and Peridynamics

Poster Presentation. IMECE2018-89258

Rui Zhang, Shogo Wada, Clint Nicely, Qian Qian, *University of Texas at Dallas, Richardson, TX, United States*