

## **Announcement: V&V Benchmark Problem 1—Twin Jet Computational Fluid Dynamics (CFD) Numeric Model Validation**

The ASME Verification and Validation in Computational Nuclear System Thermal Fluids Behavior Committee (ASME V&V30 Standard Committee) is initiating a series of benchmark problems designed to:

- Study the scope and key ingredients of the V&V30 committee’s charter.
- Achieve the above objective by using new, high-quality, state-of-the-art validation data sets recorded specifically for this purpose, and
- Achieve the above objectives using a stepwise, progressive approach characterized by focusing on each key ingredient individually in a problem designed for that purpose. The full spectrum of problems will be introduced, in draft form, during the seminar to be held during the upcoming 2016 ASME V&V Symposium in Las Vegas in May, 2016.

**A Summary Description of the First Problem:** In the context of investigating the mixing between and the penetration of two parallel twin jets which are typical for an advanced liquid metal-cooled reactor<sup>1</sup>, a scaled twin-jet experiment was designed to generate validation data at Reynolds numbers typical of operational conditions in the upper plenum of the reactor. The working fluid is water and the velocity field was measured in detail using advanced particle image velocimetry (PIV) and laser Doppler anemometry (LDV) with measurement uncertainties obtained using ASME practices (ASME PTC 19.1 Test Uncertainty). A detailed description of the problem is available in: H. Wang and Y. Hassan, “Benchmark Data for Computational Simulations of Nuclear System Thermal Fluids Behavior,” Texas A&M University, December, 2015.

**Objective of First Problem:** Apply the V&V practices necessary to ensure an appropriately validated computational solution is obtained. The participant’s V&V effort should be based on the above data set which will be provided by the ASME V&V30 committee when the participant registers for the benchmark exercise. For those participants from the nuclear community, the V&V30 committee encourages them to use whatever V&V practices they would normally use in the context of preparing a document which they might submit to the U.S. Nuclear Regulatory Commission for review.

**Protocol for Participating in the First Problem:** When the participating organization or individual registers to take part in the benchmark exercise, they will perform their calculation using the standard protocol and procedures accepted by their engineering community and sponsoring organization. Questions will be addressed to the point-of-contact (POC) listed below and answers will be provided by members of the benchmark problem committee. The results of the participants study and calculations will be presented at the 2016 ASME V&V Symposium in Las Vegas in May, 2016. Please note that this

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<sup>11</sup> These data may also characterize twin jet behavior in the lower plenum of a very high temperature reactor. Also, the test facility may also be used to obtain natural circulation data characterizing twin jet behavior in the upper plenums of both a liquid-metal cooled reactor and the very high temperature gas-cooled reactor.

benchmark effort is not intended as a competition among companies or individuals, but rather is intended as a demonstration of the state of the practice in using and applying computational tools to support U.S. Nuclear Regulatory Commission reviews. The outcome of this first benchmark effort will be lessons learned, review of V&V methods, and effectiveness of V&V methods to support modeling and simulation reviews.

The results of the various participants will be summarized and compared in a subsequent report produced by the benchmark problem committee at the following 2017 V&V Symposium.

**Key Dates:** The participants will give a detailed presentation of their approach to the benchmark problem solution and the use of V&V methods appropriate to their simulation at the V&V30 Workshop session, to be held during the 2016 ASME V&V Symposium in May, 2016 in Las Vegas, NV. The participants will provide to the organizers, a copy of their detailed presentation so that an archive of this activity can be maintained for future reference.

**Submission Requirements:** The presentation will follow ASME formatting requirements—as described on the V&V2016 web site.

**Point-of-Contact for Obtaining Further Information and Submitting Results:** Ryan Crane, V&V30 Secretary (ASME)—[craner@asme.org](mailto:craner@asme.org)

**V&V30 Benchmark Problem Committee:**

Ryan Crane (ASME)

Christopher Freitas (Southwest Research Institute)

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Arthur Ruggles (University of Tennessee)

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