



Journal of Computational and Nonlinear Dynamics

Special Issue on Dynamics of Systems with Impacts

A system undergoing impacts can have strong nonlinear characteristics and the system response can experience unique qualitative changes. Impacts can occur in a wide range of systems, and the wide interest in them has spurred researchers to explore different tools for analyses and simulations, and experiments with real, physical systems.

In single degree of freedom (DOF) oscillators, impacts can occur with a barrier while in a system with multiple DOF, one can additionally observe impacts amongst interacting bodies. On one hand, impacts are intrinsic for the operations of many engineering devices. On the other hand, impacts may induce dangerous forces or perturb operations in systems where we expect to have smooth dynamics. In both situations, a deep understanding of the system dynamics can help predict the system behavior and also form a picture of the implications of impacts. Systems experiencing impacts are part of a large group of systems modeled by discontinuous differential equations; their dynamics is also interesting from a theoretical standpoint. Finding accurate numerical solutions of a discontinuous system of equations remains a challenging task in the field of nonlinear dynamics. There are many open problems associated with numerical and analytical investigations of impact oscillators; for example, the current toolboxes for continuation can only be used to determine the bifurcation diagrams for specific types of equations and constraints.

Systems with impacts are used to model drilling in hard materials, milling, impact print hammers as well as shock absorbers and much more. In these systems, there are still lot of challenging practical problems to solve, one of them being downscaling of drilling rigs used for installation of underground cables and pipes. Another application of impacting systems is in the modeling of gear transmissions, wherein interactions between gears involve impacting and sticking events. Thus, to reach high efficiency and reliability, one has to reduce these events to a minimum.

Impact may cause the following effects: severe forces and stresses, rapid transfer of energy, and large acceleration impulses. These effects are associated with complex system dynamics, and in many cases, control of these systems is difficult to do. Sophisticated control algorithms may be needed to address all of the aforementioned effects. Damage caused by impacts is a topic of many studies in civil and materials engineering, where the trend to introduce lighter materials has to be reconciled with the resistance of systems made with them. Similar considerations are needed for ships whose collisions with floating objects cannot be ignored. In many structures (e.g., buildings, siloes, containers, scaffoldings, and free standing power transformers), hazardous external excitations (e.g., earthquake, rogue waves) may lead to overturning through rocking instabilities involving impacts.

Submission Guidelines

A main focus of this special issue is to capture and present recent work and advances on applications and theory related to systems with impacts. The guest editors of this issue are interested in original research and review articles that are related to the following:

- Analytical and numerical studies; for example, application of harmonic balance method, mapping and averaging techniques, path-following, and time-frequency methods
- Investigations into solution characteristics and bifurcation scenarios
- Dynamics under different conditions of impacts; for example, low and high velocity impacts, soft and hard impacts; effects of contact stiffness/damping and clearance
- Dynamics of multi-body systems with impacts
- Transfer of energy between impacting bodies
- Use of computational methods (e.g., finite element and other methods) in the modeling of impacting bodies
- Wear, damage, and fracture caused by interactions between bodies
- Influence of external noise on system's dynamics
- Control of dynamics of impacting systems

Papers can be submitted until the deadline via the Journal of Computational and Nonlinear Dynamics online submission system available on the journal web page: <http://www.asmedl.org/CND>. In the journal web tool, please direct your submission to the special issue on "Dynamics of Systems with Impacts".

All submitted papers will be peer-reviewed according to the usual standards of the journal, and the papers will be evaluated on the basis of originality, quality, and relevance to this special issue and the journal. The submitted papers should be formatted according to the journal style as described on the journal homepage. Submitted papers must not have been published previously, nor be under consideration for publication elsewhere.

Important Dates

Paper submission: open until the deadline

Paper submission deadline: October 1, 2016

Publication (tentative): 3rd or 4th Quarter, 2017

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