



# Journal of Computational and Nonlinear Dynamics

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## **Special Issue on Geometric Methods and Formulations in Computational Multibody System Dynamics, Coupled Problems, and Control**

Multibody systems are dynamical systems characterized by intrinsic symmetries and invariants. Geometric mechanics deals with the mathematical modeling of such systems, and has proven to be a valuable tool providing insights into the dynamics of mechanical systems, from a theoretical as well as from a computational point of view.

Modeling multibody systems, comprising rigid and flexible members, as dynamical systems on manifolds, and Lie groups in particular, leads to frame-invariant and computationally advantageous formulations. Such formulations and the corresponding algorithms are becoming increasingly used in various areas of computational dynamics providing the conceptual and computational framework for multibody, coupled, and multi-physics systems, and their non-linear control.

The geometric setting furthermore gives rise to geometric numerical integration schemes that are designed to preserve the intrinsic structure and invariants of dynamical systems. These naturally avoid the longstanding problem of parameterization singularities, and also deliver the necessary accuracy as well as a long term stability of numerical solutions.

Beside these numerical issues, dynamical systems on manifolds are naturally regulated using geometric control methods that make explicit use of the geometry underlying a control system.

The current intensive research in these areas documents the relevance and potential for geometric methods in general and in particular for multibody system dynamics and control as well as for coupled problems. This special issue aims at providing an overview of current state of research on (differential) geometric methods pertinent to the field in the form of a collection of original research and review articles.

Papers are solicited dealing with mathematical modeling and numerical methods, geometric control and design strategies as well as multi-physics approaches.

All submitted papers will be peer-reviewed and selected on the basis of originality, quality, and their relevance to the theme of this special issue.

### **Submission Guidelines**

This special issue calls for original papers describing the latest developments relevant to geometric methods and formulations in multibody system dynamics, coupled problems and control. Topics of interests include, but are not limited to:

- multibody systems (rigid and flexible)
- continua and structures
- fluid-structure interaction
- discrete mechanics
- holonomic and non-holonomic systems
- contact mechanics
- electro-mechanical applications

- geometric and Lie-group integration schemes
- energy/momentum preserving integration schemes
- control problems (robotics, aerospace, biomechanics, autonomous 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 “Geometric Methods and Formulations in Computational Multibody System Dynamics, Coupled Problems, and Control”.

All submitted papers will be peer-reviewed according to the usual standards of the journal, and 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, 2015

Publication (tentative): 3rd or 4th quarter, 2016

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