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Symmetry and Control of Discrete and Continuous Systems

Guest Editors:

Prof. Dr. Marco Favretti
Dipartimento di Matematica Tullio Levi-Civita, Università degli Studi di Padova, 35121 Padova, Italy

Prof. Dr. Franco Cardin
Department of Mathematics "Tullio Levi-Civita", University of Padua, via Trieste 63, Padua, Italy

Dr. Andrea Giacobbe
Department of Mathematics and Computer Science, Università degli Studi di Catania, Viale Andrea Doria 6, 95125 Catania, Italy

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Message from the Guest Editors

Physical theories derived from variational principle symmetries are a key feature because they reveal the existence of conserved quantities. This aspect has been fully investigated using modern geometric mechanics from the first ancestral results to more recent and fruitful notions. The presence of symmetries reduces the dimensionality of the system.

In a different vein, a variational theory may account for externally imposed constraints on the system evolution by the Lagrange multipliers method. The geometry of constrained variational principles is described in terms of Lagrangian (or Legendre) submanifolds, and it has a pivotal role for the geometric formulation of thermodynamics and statistical mechanics via the maximum entropy principle. Moreover, constrained variational principles are at the core of the modern geometric formulation of control theory for mechanical systems, nonholonomic mechanics, optimal transport theory, and finite exact reduction. We think that the interplay between variational principles, conserved quantities and active control is a fruitful framework for theoretical development and the design of technological applications.

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Editor-in-Chief

Prof. Dr. Sergei D. Odintsov
1. Institució Catalana de Recerca i Estudis Avançats (ICREA), Passeig Luis Companys, 23, 08010 Barcelona, Spain
2. Institute of Space Sciences (ICE-CSIC), C. Can Magrans s/n, 08193 Barcelona, Spain

Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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Contact Us

Symmetry Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland

Tel: +41 61 683 77 34
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mdpi.com/journal/symmetry
symmetry@mdpi.com
𝕏@Symmetry_MDPI