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Advances in Control Systems and Symmetry/Asymmetry

Guest Editor:

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Message from the Guest Editor

Dear Colleagues,

A nonlinear system with symmetry can be decomposed into interconnected lower-dimensional subsystems, where the subsystem architecture is determined by the symmetry group's structure. For general nonlinear control systems, the concept of symmetry can be used to analyze stability, design controllers, and construct observers. Furthermore, kinetic symmetry can be used to address the control issue of high-order nonlinear mechanical systems with complex underactuated characteristics and input coupling through reduction. Cascade nonlinear systems can be obtained through the kinetic symmetry-based decoupling framework, e.g., strict feedback form, strict feedforward form, and nontriangular quadratic form. The applications are broad in advanced robot-related research, e.g., unmanned vehicles, manipulators, spacecrafts, bionic robots, humanoid robots, etc. Additionally, many robotic systems simultaneously exhibit symmetric and asymmetric constraints. Hence, addressing the control problem in the presence of time-varying asymmetric input/output constraints is also an important issue.

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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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