Journal of Computational and Nonlinear Dynamics

Editorial

Special Issue on "Discontinuous and Fractional Dynamical Systems"

The recognition of the unpredictability in science leads to the adoption of new concepts and ideas from emerging areas and autoorganizing systems as a rationalization of a priori improbable, but a posteriori important results in many research processes. In human history, many existing studies have provided milestones in the way we think and conduct research. However, some of them could not be assimilated during the time period of development of the theory and methodology. As some philosophers say, people see only what they are prepared to see.

This special issue is devoted to "discontinuous and fractional dynamical systems," which is a paradigmatic example. In the past, the scientific community did not pay enough attention either to discontinuous systems or to fractional dynamics until enough existing facts from different aspects were able to enlighten an entire picture toward such phenomena. For instance, the impact of two rocks is a discontinuous phenomenon and the interface of the sea waves with a rocky coast reveals a fractional dynamics. It seems that these simple ideas are somehow exotic or even anomalous to many scientists. However, the corresponding foundation for such problems in physics and mathematics is well established. For instance, the idea of a fractional derivative was initiated in 1695, by Leibniz, in a letter to L'Hospital, and its applications can be viewed in the book "Electromagnetic Theory" by Olivier Heaviside in 1893.

Bearing these ideas in mind, in this special issue, we intend to stimulate the attention of the research community, in general, and of the readers of the Journal of Computational and Nonlinear Dynamics, in particular. In recent years, the powerful computational methods and the analysis of nonlinear phenomena have led to the emergence of discontinuous dynamical systems and of fractional dynamical systems. Such phenomena can be observed almost everywhere. In order to enrich the spectrum of the special issue, the selected articles cover the theoretical and applied studies in discontinuous and fractional dynamical systems from physics and engineering. Therefore, this special issue includes 18 articles spanning through mathematical theory, modeling, implementation, and control. Many readers may feel "uncomfortable" for what is achieved by this special issue, and they may decide to revisit the latest research results in these promising areas. If this is a case, then this special issue has served its purpose.

Finally, we would like to express our sincere gratitude to Professor Subhash C. Sinha for promoting and supporting this special issue. Herein, we would like to express our appreciations to our reviewers who were helpful in enhancing the quality of these articles. Thanks are also due to ASME staff for a timely publication of this special issue. We sincerely hope our readers will like and enjoy all articles in the special issue.

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Guest Editors