Mathematical Problems in Engineering

Special Issue on New Challenges in Fractional Systems 2014

Call for Papers

Fractional order differentiation consists of the generalization of classical integer differentiation to real or complex orders. From a mathematical point of view, several interpretations of fractional differentiation were proposed, but there is still a deep debate about it. The fractional differentiation and fractional integration are nonlocal operations based on an integral with a singular kernel. This explains why these operators are still not well defined and that several definitions still coexist. Since the first recorded reference worked from 1695 up to the present day, many papers have been published on this subject, but much progress is still to be done particularly on the relationship of these different definitions with the physical reality of a system.

A fractional order system is a system described by an integrodifferential equation involving fractional order derivatives of its input(s) and/or output(s). From a physical point of view, linear fractional derivatives and integrals order systems are not classical linear systems and not quite conventional distributed parameter systems. They are in fact halfway between these two classes of systems and are a modeling tool well suited to a wide class of phenomena with nonstandard dynamic behavior, and the applications of fractional order systems are now well accepted in the following disciplines. Potential topics include, but are not limited to:

- Signal processing (filtering, restoration, reconstruction, analysis of fractal noises, etc.)
- Image processing (fractal environment modeling, pattern recognition, edge detection, etc.)
- Economy (analysis of stock exchange signals, etc.)
- Electrical engineering (modeling of motors, transformers, skin effect, etc.)
- Electronics and telecommunications (phase-locking loops, etc.)
- Electromagnetism (modeling of complex dielectric materials, etc.)
- Electrochemistry (modeling of batteries and ultracapacitors, etc.)
- Thermal engineering (modeling and identification of thermal systems, etc.)
- Mechanics and mechatronics (viscoelasticity, vibration insulation, etc.)
- Automatic control (system identification, observation, and control of fractional systems, etc.)
- Biology and biophysics (signal and models of biological systems, viscoelasticity in biology, etc.)
- Physics (analysis and modeling of diffusion phenomenon, etc.)

The goal of the present special issue is to address the latest developments in the area of fractional calculus application in signals and systems. Papers describing original research work that reflects the recent theoretical advances and experimental results and opens new avenues for research are invited on all aspects of object tracking.

Before submission authors should carefully read over the journal's Author Guidelines, which are located at http://www.hindawi.com/journals/mpe/guidelines/. Prospective authors should submit an electronic copy of their complete manuscript through the journal Manuscript Tracking System at http://mts.hindawi.com/submit/journals/mpe/ncfs14/ according to the following timetable:

Manuscript Due	Friday, 13 June 2014
First Round of Reviews	Friday, 5 September 2014
Publication Date	Friday, 31 October 2014

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