

Stability, Periodicity, and Related Problems in Fractional-Order Systems

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Abstract: This Special Issue aims to collect new perspectives on the trends in both theory and applications of stability of fractional order continuous and discrete systems, analytical and numerical approaches, and any related problems regarding (but not limited to) time-delayed systems and impulsive systems in all fields of science, as well as engineering and multidisciplinary applications.

Keywords: fractional-order system; stability; periodic solution; fractional calculus

MSC: 37N30; 34K37; 26A33



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This paper contains the submissions [1–5] invited to a Special Issue of *Mathematics* on “Stability, Periodicity, and Related Problems in Fractional-Order Systems”.

Fractional-order systems (FOSs), which are said to have fractional dynamics, are modeled by differential equations with non-integer derivatives. Integrals and derivatives of fractional orders illustrate objects with power-law nonlocality, power-law long-range dependence (time history), or fractal properties. FOSs are used to study behavior in nonlinear chaotic systems in electrochemistry, biology, viscoelasticity, physics, etc.

The response to our call for this Special Issue resulted in the following statistics for both published and rejected items: 12 total submissions, of which 5 research articles were published (41.66%), and 7 were rejected (58.3%).

The technical topics covered in the five articles published in this book include:

- The existence and uniqueness of solutions for a nonlinear coupled system of Liouville–Caputo-type fractional integrodifferential equations supplemented with non-local discrete and integral boundary conditions [1] for a coupled system of ψ -Caputo hybrid fractional derivatives of the order of $1 < \nu \leq 2$ subjected to Dirichlet boundary conditions [2].
- A study of a class of a coupled system of fractional integrodifferential equations in the frame of Hilfer fractional derivatives with respect to another function [3].
- A study of a system of coupled discrete fractional-order logistic maps, modeled by Caputo's delta fractional difference in terms of its numerical integration and chaotic dynamics [4].
- An existence theorem for a unique solution to the fuzzy fractional Volterra–Fredholm integrodifferential equations (FCFVFIDEs) to our result involving the Caputo derivative [5].

We found that the paper selections for this book were very inspiring and rewarding. We also thank the editorial staff and reviewers for their efforts and help during the process.

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