

Special Issue on
**Recent Developments of the Discretization of Fractional
Differential Equations with Applications**

CALL FOR PAPERS

Fractional differential equations are used to model many problems such as anomalous diffusion, viscoelasticity, biological tissues (liver, heart valve, and brain), and bioengineering (bioelectrodes, biomechanics, and bioimaging). The discretized fractional system and the fractional difference equations have many applications in quantum theory, insect population models, neural networks, heat transfer, and epidemic models. Since the fractional derivative has the memory properties, fractional differential equations can describe the physical system more accurately. It is not possible to find the analytic solutions of the general fractional differential equations. Therefore it is necessary to consider the discretization of the fractional differential equations and study the dynamics of the discretized fractional difference equations. Compared with the discretization of the integer order differential equation, the discretization of the fractional differential equations is more complicated and more difficult. It is necessary and timely to develop some efficient and higher order methods to approximate the fractional derivatives and analyze the dynamics of the discretized fractional difference equations.

This Special Issue invites papers that focus on the recent and novel developments and achievements in the following fields: 1) the approximation methods of the fractional derivatives which include Riemann-Liouville, Caputo, and Riesz fractional derivatives, 2) the study of the discretized system of the fractional differential equations and the fractional difference equations, 3) the efficient and higher order numerical methods for solving fractional differential equations which include finite difference, finite element, and spectral methods, and 4) the application of the fractional differential equations and fractional difference equations.

Potential topics include but are not limited to the following:

- ▶ Approximate methods to fractional derivatives
- ▶ Fractional difference equations
- ▶ Nonlinear fractional dynamics in physics
- ▶ Systems with memory in biology, physiology, and neuroscience
- ▶ Fractional order signals, systems, and controls
- ▶ Discretization of fractional ODEs and PDEs
- ▶ Discretization of fractional integral equations and integral-differential equations
- ▶ Discretization of fractional stochastic ODEs and PDEs
- ▶ Fractional delay differential equations
- ▶ Fractional dynamic system
- ▶ Fractional integral transforms and applications
- ▶ Fractional dynamics and systems with memory in social science
- ▶ Numerical methods for solving fractional differential equations: finite element method, finite difference methods, and spectral methods

Authors can submit their manuscripts through the Manuscript Tracking System at <http://mts.hindawi.com/submit/journals/ddns/rddf/>.

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