DE GRUYTER

PREDICTING PATTERN ALTERATIONS IN NATURE

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DESCRIPTION

To simulate the behaviors, present in situations in the real world, modelers use mathematical techniques. Deterministic and stochastics are two important groups that have emerged in recent years. While deterministic systems use initial conditions and some fixed or variable parameters to build future states of the system, stochastic models aid in the capturing of processes with random tendencies. With some success and some drawbacks, these two ideas have been used in every branch of science, technology, and engineering. Different processes observed in nature can be replicated using a variety of differential operators. For example, processes displaying memoryless characteristics can be well represented using the differential operator with Delta-Dirac kernel, often known as the classical differential operator. This operator has been used in traditional mechanical processes. A novel idea termed fractional calculus, based on a power law kernel, was proposed to deal with physical issues exhibiting processes with power law tendencies. It has been used, and occasionally abused, in many fields. Fading memory processes are present in a variety of real-world issues, and they can be described using differential operators with an exponential decay kernel. When the process switches from fading memory to power law, it becomes an interesting example. To address these issues, a differential operator based on the generalized Mittag-Leffler function was developed. However, it has been noted that there are numerous issues in everyday life for which behaviors alter through time and space.

The cardiac rhythm is a prime example, as it may produce a variety of actions depending on the human's mood, ranging from regular to irregular to no beat. Another illustration is the decay process of an individual, in which the mass as a function of time exhibits a transition from fast decay to very slow decay. These anomalies are seen throughout the complex actual world, and they cannot be modeled using the well-known differentiation and integration techniques. In epidemiology, gathered data depicting daily new infections with varying waves exhibit patterns ranging from stochastic, Gaussian to non-Gaussian distributions and many others. Many other natural phenomena, such as the movement of water from one kind of geological formation to another.

Therefore, the advancement of the theory, approaches, and applications of differential and integral operators with crossover features is the focus of this special issue. As a result, the problem presents an opportunity to open a new line of inquiry for academics from various scientific backgrounds to engage in speculative and practical research with the sole purpose of understanding, analyzing, and modeling the complex real world, where behaviors change patterns over a variety of time and space intervals. As a result, the special issue will compile papers that include but are not limited to.

- Existence and uniqueness of ODE with crossover properties
- Modeling processes with crossover from deterministic to stochastic
- New Numerical approaches and application
- Analytical methods and their application to processes with different patterns
- Chaos processes crossovers in patterns
- Subsurface water movement and transport in anomalous media
- Modeling crossover behaviours in epidemiology
- Signal analysis and biological systems

HOW TO SUBMIT

Before submitting, authors should carefully read the Instructions for Authors, which are available at: https://www.degruyter.com/publication/journal_key/PHYS/downloadAsset/PHYS_Instruction%20for%20Authors.pdf

Manuscripts should be submitted to the journal via the online Editorial Manager submission system available at: https://www.editorialmanager.com/openphys/default.aspx

All submissions will undergo the standard single-blind peer review system. When entering your submission please choose the category section of the article: "**Predicting pattern alterations in nature**".

Submissions for the special issue are now open. In case of any technical problems, please contact the Managing Editor of **Open Physics**: **Juliusz Skoryna, Ph.D., Juliusz.Skoryna@degruyter.com**

SUBMISSION DEADLINES

Author invitation date
The date on which author invitations will be sent: **June 15, 2023**

Date the first submission is expected
submission portal will be open from this date **June 15, 2023**

Manuscript submission deadline
The date by which all manuscripts should have been submitted for evaluation **December 31, 2023**

Editorial acceptance deadline
The date by which all manuscripts should be fully reviewed, and all final decisions have been made **December 15, 2023**