

# ADVANCED TOPICS ON THE MODELLING AND ASSESSMENT OF COMPLICATED PHYSICAL PHENOMENA

## GUEST EDITORS

---

**Dumitru Baleanu**, Cankaya University, Turkey, [dumitru@cankaya.edu.tr](mailto:dumitru@cankaya.edu.tr)

**Juan J. Nieto**, Universidade de Santiago de Compostela, Spain, [juanjose.nieto.roig@usc.es](mailto:juanjose.nieto.roig@usc.es)

**Amin Jajarmi**, University of Bojnord, Iran, [a.jajarmi@ub.ac.ir](mailto:a.jajarmi@ub.ac.ir)

**Ali Ahmadian**, The National University of Malaysia, Malaysia, [ahmadian.hosseini@gmail.com](mailto:ahmadian.hosseini@gmail.com)

## DESCRIPTION

---

For many years, the area of complex dynamical systems has attracted the attention of many scientists due to its practical importance in real-world applications. Complicated physical systems exhibit several properties such as power laws, scaling, self-similarity, self-organized criticality, etc. Thus, the modelling and assessment of such systems are of great importance from both mathematical and physical points of view. Recently, fractional calculus has played a remarkable role in the modelling of real world physical phenomena. The practical importance of fractional calculus comes from the fact that the associated differential/integral operators can capture the hidden aspects of real-world dynamics more accurately than ordinary time-derivatives. The aim of this special issue is to report the recent advancement and progress of fractional calculus for the modelling of complex physical systems by new modern, well-defined strategies. The scope of this special issue covers all theoretical and practical aspects of mathematical modelling arising in physics in the framework of fractional calculus. Topics for submissions also include but are not limited to:

- ▶ Complex dynamical systems in physics
- ▶ Fractional calculus and its applications in physics
- ▶ Fractional models
- ▶ Digital twins of complex physical phenomena
- ▶ Machine learning in complex phenomena
- ▶ Hybrid complex systems under uncertainty
- ▶ Uncertain fractional dynamical systems
- ▶ Generalized fractional derivatives and integrals
- ▶ Non-local operators
- ▶ Fluid dynamics and heat transfer modelling
- ▶ Nonlinear physical systems
- ▶ Calculus of variations in physics
- ▶ Stochastic physical processes
- ▶ Bifurcation and chaos in physics

- ▶ Discrete fractional calculus with physical applications
- ▶ Other relevant topics

## IMPORTANT DATES

---

Paper submissions starts: **January 15<sup>th</sup>, 2022**

Paper submissions ends: **October 1<sup>st</sup>, 2022**

Paper published online: **December 1<sup>st</sup>, 2022**

## HOW TO SUBMIT

---

When entering your submission please choose the option type of an article: “**Advanced topics on the modelling and assessment of complicated physical phenomena**”

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](mailto:Juliusz.Skoryna@degruyter.com)