ADVANCED NUMERICAL METHODS AND ALGORITHMS IN COMPUTATIONAL PHYSICS: NEW TRENDS AND CHALLENGES

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DESCRIPTION

Fractional calculus has many real-life applications in such widespread areas in the physical, mathematical, statistical and engineering sciences as (for example_ viscoelasticity, chemical engineering, signal processing, bioengineering, control theory and fluids mechanics. In most situations, the mathematical models depend on initial conditions and the fractional-order derivatives are non-local in nature. Owing to real-life applications of fractional calculus and for the better understanding of many of these mathematical models, it is an essential requirement to replace the integer-order derivatives by fractional-order derivatives in the given model. Many mathematical models in engineering sciences, physical sciences, chemical sciences and biosciences are accurately governed by fractional-order model. Since integer- order mathematical models are a special case of the corresponding fractional-order mathematical models, the results for the fractional mathematical models are more general and more accurate. These results are immensely helpful for engineers, mathematicians, scientists and researchers working on the real-life problems. We believe that many of the great developments will come from the applications of the fractional calculus in the field of mathematical modelling. Due to this reason, we aim at promoting this area of research by means of the proposed Special Issue.

This Special Issue in <u>Demonstratio Mathematica</u> aims to consider computational methods related to fractional-order models in physics and their numerical treatment via tools and techniques from mathematics. In particular, it will consider only advanced numerical methods so as to provide with global solution for physical models considering long-time beneficial perspective. The solution should also be helpful in understanding a physical model more closely. We invite review and original research articles dealing with advanced and new numerical methods and techniques on the following topics as well as on other associated topics having relevance in computational physics.

Potential topics include but are not limited to the following:

- ▸ Advanced numerical treatment for fractional-order physical models
- ▸ Error analysis for fractional-order physical models
- ▸ Stability analysis of fractional-order physical models
- ▸ Chaotic dynamics of physical models
- ▸ Numerical methods for non-linear differential equations arising in physics
- ▸ Numerical methods for non-linear difference equations arising in physics
- ▸ Numerical methods for system of differential equations arising in physics

- ▶ Numerical methods of functional equations arising in physics
- ▶ Numerical treatment for fractional-order control problems
- ▶ Numerical treatment for fractional-order modelling of real-world phenomena

We are also interested in survey articles summarizing the evolution of specific problems.

Authors are requested to submit their full revised version of papers complying the general scope of the special issue. The submitted papers will undergo the standard peer-review process before they can be accepted. Notification of acceptance will be communicated as we progress with the review process.

HOW TO SUBMIT

Before submission authors should carefully read the Instruction for Authors.

Manuscripts have to be written in LATEX, AMS-TEX, AMS-LATEX. We do not accept papers in Plain TEX format. **For an initial submission, the authors are strongly advised to upload their entire manuscript, including tables and figures, as a single PDF file***.* Authors are strongly advised to submit the final version of the paper using the journal's LATEX template.

All submissions to the Special Issue must be made electronically via online submission system Editorial Manager and will undergo the standard peer-review process (single blind, at least two independent reviewers). When entering your submission choose the section/category "*Special Issue on Advanced Numerical Methods and Algorithms in Computational Physics*".

The deadline for submissions is now extended **by 10th May 2021**, but individual papers will be reviewed and published online on an ongoing basis.

Authors who have limited access to funding for open access publications may **apply for a discount**. Inquiries concerning Article Processing Charges should be addressed before or immediately after submission of a paper to the Editorial Office (demonstratio.editorial@degruyter.com)

Contributors to the Special Issue will benefit from:

- ▶ indexation in **Web of Science (Emerging Sources Citation Index)** and **SCOPUS**
- ▶ comprehensive and transparent peer review provided by experts in the field
- ▶ no space constraints
- ▶ **quick publication** after completing the publishing process **(continuous publication model)**
- ▶ better visibility due to **Open Access**
- ▶ **long-term preservation** of the content (articles archived in Portico)
- ▶ **liberal policies on copyrights** (authors retain copyrights) and on self-archiving (no embargo periods)

We are looking forward to your submission!

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