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Conservation Laws, Symmetry Analysis and Variational Principle for Discontinuous Problems

Guest Editors:

Prof. Dr. Ji-Huan He
National Engineering Laboratory for Modern Silk, College of Textile and Clothing Engineering, Soochow University, 199 Ren-Ai Road, Suzhou, China

Dr. Muhammad Nadeem
Faculty of Science, Yibin University, Yibin 644000, China

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Message from the Guest Editors

Dear colleagues,

Lie theory, symmetry analysis, conservation law, and variational principle are useful mathematical tools for various nonlinear differential equations, and their extensions for non-differential problems have increasingly become more promising.

This Special Issue focuses itself on fractal differential equations for various discontinuous problems using the two-scale fractal theory and two-scale mathematics.

The two-scale method considers the same problem by using two different scales—the larger scale always leads to a differential model by the continuum mechanics, while the smaller scale can figure out the discontinuous property of the same problem. For example, water is continuous on a micro scale, and all laws in fluid mechanics can be used to describe its motion. However, when we measure the motion on a molecule's scale, many uncertainty phenomena arising in the macro observation can be solved certainly.

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Editor-in-Chief

Prof. Dr. Sergei D. Odintsov
1. Institució Catalana de Recerca i Estudis Avançats (ICREA), Passeig Luis Companys, 23, 08010 Barcelona, Spain
2. Institute of Space Sciences (ICE-CSIC), C. Can Magrans s/n, 08193 Barcelona, Spain

Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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Contact Us

Symmetry Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland

Tel: +41 61 683 77 34
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mdpi.com/journal/symmetry
symmetry@mdpi.com
𝕏@Symmetry_MDPI