fractal and fractional

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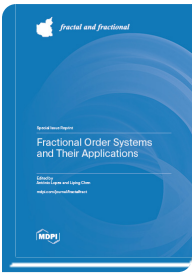
Special Issue Reprint

Fractional Order Systems and Their Applications



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Fractional calculus (FC) generalizes the concepts of derivative and integral orders to non-integer orders. It was introduced by Leibniz (1646–1716) but remained a purely mathematical exercise for a long time, despite the original contributions to the field of important mathematicians, physicists, and engineers. FC has experienced rapid development in recent decades, both in mathematics and applied sciences, being recognized as an excellent tool to describe complex dynamics. Based on this, several models governing physical phenomena in the areas of science and engineering have been reformulated in light of FC for them to better reflecting their non-local and frequency- and history-dependent properties. Applications of FC include modeling of diffusion, viscoelasticity, and relaxation processes in fluid mechanics; the dynamics of mechanical, electronic, and biological systems; and signal processing and control.

This reprint compiles articles from the Special Issue “Fractional Order Systems and Their Applications”, which focused on original and new research results on modeling and control of fractional order systems with applications in science and engineering. It includes 13 manuscripts addressing novel issues and specific topics that illustrate the richness and applicability of fractional calculus.

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