



*fractal and fractional*



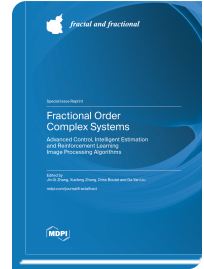
*Special Issue Reprint*

## **Fractional Order Complex Systems: Advanced Control, Intelligent Estimation and Reinforcement Learning Image Processing Algorithms**

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Fractional-order systems extend classical integer-order models, providing a more accurate description of real-world physical phenomena. In image processing, critical techniques like noise suppression and image fusion in medical imaging are essential for clinical diagnosis and treatment. The increasing diversity of image acquisition models has further emphasized the importance of these techniques. Recent advancements have positioned fractional operators as a key component in image processing, serving as powerful tools for noise reduction and feature enhancement. Additionally, the development of new fractional operating tools has significantly enhanced the analysis and design of nonlinear control systems. Singular systems, characterized by singular differential equations, exhibit unique properties distinct from classical systems. Methodologies for fractional-order control systems, inspired by integer-order approaches, are gaining traction within the control community due to their enhanced capabilities. This Special Issue highlights the latest developments in fractional calculus and its transformative impact across multiple disciplines, setting the stage for future innovations in applied mathematics and engineering.



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