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Fractal Media and Fractional Viscoelasticity

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Message from the Guest Editors

Fractional calculus has attracted considerable interest because of its ability to model complex phenomena in solid materials, fluids, and various dynamical systems. While the fractional integral has been used to describe the fractal structure of materials, the connections between fractal geometry and fractional-order calculus provide interesting opportunities and fundamental challenges to more accurately describe viscoelasticity, thermal and chemical diffusion, light–matter interactions, and their uncertainty. Recently, a physical connection between the fractional time derivative and fractal geometry of fractal media has been described and applied to viscoelasticity and thermal diffusion in elastomers. This has opened up new questions about the use of fractional calculus in engineering applications, which may help us elucidate complex multiscale processes in materials, fluids, and engineered systems.