



Fractional Behavior in Nature 2019

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Message from the Guest Editor

It is already known that the non-integer order systems can describe the dynamical behavior of materials and processes over vast time and frequency scales, with very concise and computable models.

1. There is evidence that most of the biological signals have spectra that do not increase or decrease by multiples of 20 dB/sec.
2. The long-range processes (1/f noise sources)—the fractional Brownian motion (fBm) is the most famous—are very common in nature.
3. The power law behavior can be found in many processes.

On the other hand, and looking from a much deeper perspective, the fractional derivative implies causality. By respecting the proper time order and including the effects of the past on the evolution of systems and processes, we open the door to a more realistic, non-Markovian view of the world, without drastically increasing the complexity of the system descriptions.

