Two Models of Multifractional Brownian Motion: Stochastic Exponents, Ergodicity and Non-Gaussianity

Aleksei (Oleksii) Chechkin[1]

[1]Max Planck Institute of Microstructure Physics, Halle (Saale), Germany

The diversity of diffusive systems exhibiting long-range correlations characterized by a stochastically varying Hurst exponent calls for generic multifractional models.We present two simple, analytically tractable models which fill the gap between mathematical formulations of multifractional Brownian motion and empirical studies. In our models, called telegraphic multifractional Brownian motions, the Hurst exponent is modeled by two different telegraph processes, namely one is a smoothed telegraph process and another is the telegraph process with random amplitude. We consider statistical properties of the two multifractional models and present concrete real-world examples.

Reference:

M. Balcerek et al., Physical Review Letters 134 (19), 197101 (2025).