How to Recognize the Anomalous Diffusion?

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Abstract

Anomalous diffusion in crowded fluids, e.g., in cytoplasm of living cells, is a frequent phenomenon. A common tool by which the anomalous diffusion of a single particle can be classified is the time-averaged mean square displacement (TAMSD). However there are also different statistics that can be useful in this problem. A validation of anomalous diffusion processes for single-particle tracking data is of great interest for experimentalists. In this presentation we demonstrate statistical methods useful in the anomalous diffusion property recognition. One of the example is the rigorous statistical test based on TAMSD for classical anomalous diffusion process, namely fractional Brownian motion (FBM) or visual test for light and heavy-tailed behaviour recognition. We demonstrate also the role of codifference, the general measure of dependence, adequate for processes with infinite variance, in the problem of the anomalous diffusion property exhibition.

References

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