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# A model for non-Gaussian transport in intracellular media

Recent progresses in single particle tracking have shown evidences of non-Gaussian distribution of displacements in biological media either near the cellular membrane or inside the cytoskeleton. A similar behavior has also been reported in granular media, turbulent flows, gels, colloidal suspensions. Its emergence in various fields suggests that this is a general feature of diffusion in complex media. A possible interpretation of this phenomenon is that tracers experience a medium with spatio-temporal fluctuations which result in local changes of diffusivity. We propose and investigate an ergodic easily interpretable model, which is based on diffusing diffusivity. Depending on the parameters, the displacement distribution can exhibit either a pure exponential shape, or a Gaussian-like behavior at small displacements with an exponential tail at large displacements, or be reduced to a purely Gaussian one in the Brownian limit. We show that the distribution converges to a Gaussian one slowly, as 1/t. We calculate relevant statistical properties and propose steps to estimate the model parameters from a sufficiently long single trajectory.

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