

$$S_t \circ c(h)(a_s)_{ti} c(s) + \mathfrak{S}_e m^i n(a_r)$$

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Diffusion in soft matter

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With the advent of sophisticated microscopic tracking techniques, researchers can now conclusively demonstrate that the use of simple Brownian motion as a universal model for diffusion in soft matter is no longer adequate. Long-term memory effects in physical systems are inconsistent with the basic assumptions of Brownian motion and yield qualitatively different behavior.

We shall look at one model of such anomalous diffusion – the Generalized Langevin Equation (GLE) – and discuss the analytic implications of losing the Markov property, which is vital to the investigation of Brownian motion among other canonical stochastic processes. Although direct rigorous work on the GLE is as yet not possible, we propose a workable approximation that comes from studying the singular zero-mass limit and begin to demonstrate its utility in the context of first passage time problems.