A Theoretical Approach to Understanding the Effect of Brownian Motion on a Particle within an Optical Trap

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Optical Tweezers (OT) have had great success in its ability to measure very small forces, especially Brownian motion (BM) of a tiny particle. However, theoretical simulations of BM may be difficult due to their random nature, which involves thermal forces acting on the particle. We investigate an analytic solution to the particle's motion under a single, low duration force to model the random thermal force. At a low Reynold's number, one may neglect the particle's mass to simplify the problem. All of this can help us increase our understanding of Brownian motion, which we also simulate numerically. We use one of Matlab's ODE solvers along with the Euler method to achieve numeric solutions to compare against.