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Two-point microrheology: modeling and simulation protocols.

Two-point microrheology is based on the fluctuations of two beads immersed in a soft matter medium. The analytical results from Crocker *et al.* (2000, Phys. Rev. Lett., 85) and Lubensky *et al.* (2000, Phys. Rev. Lett., 85) are based on the assumptions that the medium is viscoelastic and transmits fluctuations instantaneously in the form of the quasi-steady viscoelastic solution for a point source of force. We follow the same approach, modeling the full bead-bead coupled system, but without enforcing bead separation assumptions. We present direct stochastic time-domain algorithms for the the coupled nonlinear generalized Langevin equations. Finally, we linearize the system by freezing the bead separation distance R and quantify the errors made in the direct simulation and in the mean square displacements. (Received January 10, 2008)