Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Random-Walk Trajectories of Probe Particles in Viscoelastic Complex Fluids MANAS KHAN, THOMAS G. MASON, Department of Chemistry and Biochemistry, University of California at Los Angeles, Los Angeles, CA 90095, USA — Trajectories of tracer spheres in complex fluids can exhibit exotic patterns that have interesting temporal and spatial dependence. In passive particle-tracking microrheology, measured trajectories can often be converted into linear viscoelastic properties of the complex fluids. To better portray the diversity in potentially observable trajectories, we have created a random walk simulation for spheres in viscoelastic complex fluids. In a simple case, for a Maxwell-Voigt fluid, a tracer bead is modeled as a harmonically bound Brownian particle in a potential well that itself diffuses over longer time-scales. We also show trajectories for a complex fluid having a wide distribution of relaxation times, as described by a generalized Maxwell fluid, and for a different complex fluid having a significantly anisotropic viscoelasticity along orthogonal spatial directions. This generalized approach enables us to generate trajectories for a wide range of complex fluids within the limit of linear viscoelasticity, and these trajectories, when viewed at different sampling times and total observation times, provide insight into experimentally measured particle-tracking microrheology measurements.

Manas Khan
Department of Chemistry and Biochemistry,
University of California at Los Angeles, Los Angeles, CA 90095, USA

Date submitted: 15 Nov 2013 Electronic form version 1.4