Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Flow Induced by an Oscillating Sphere in Probing Complex Viscosity of Nonadsorbing Polymer Solutions** YANZHEN HE, TAI-HSI FAN, Mechanical Engineering, University of Connecticut, USA, REMCO TUINIER, Chemical Engineering and Chemistry, Eindhoven University of Technology, the Netherlands, TAKASHI TANIGUCHI, Chemical Engineering, Kyoto University, Japan — Theoretical investigation is presented for a linear viscoelastic flow induced by an oscillatory colloidal particle in nonadsorbing polymer solutions. The dilute to semi-dilute polymer solutions are treated as linear viscoelastic fluids. At small-amplitude oscillation, the polymer distribution is assumed at equilibrium and forms a depletion zone around the particle based on the mean field approximation. The analytical result based on the two-layer approximation is compared with numerical results using a continuous depletion profile to describe the nonuniform complex viscosity in the flow field. Depending on the polymer concentration, solution conditions and depletion thickness, the obtaining apparent complex viscosity or friction coefficient sensed by the particle could deviate significantly from the actual viscosity of the bulk polymer solution. The models developed can be applied, along with active and passive colloidal probing methods, for microrheological measurements of complex fluids that take depletion into account.

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Date submitted: 07 Nov 2015 Electronic form version 1.4