Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Active Microrheology of Dense Colloidal Suspensions ALEXANDER MEYER, ERIC M. FURST, Department of Chemical Engineering, University of Delaware — We investigate the active microrheology of a colloidal suspension using laser tweezers. The experimental system described here is composed of a hard sphere suspension of fluorescent, index-matched poly(methyl methacrylate) particles seeded with a low concentration of index-mismatched melamine probes. The probe particles are held in an optical trap and subjected to a uniform flow, enabling measurements of the suspension microrheology. Additionally, confocal microscopy is used to obtain non-equilibrium microstructural information. An anisotropic pair distribution function, with a dense region at the leading surface of the probe and a wake trailing it, is observed as the Péclet number increases to much greater than unity. This structural transition gives rise to a shear thinning regime in the measured microviscosity. The results are in qualitative agreement with recent simulation [I. C. Carpen and J. F. Brady, J. Rheol. 49, 1483-1502 (2005)], and demonstrate the non-linear microrheology of colloidal suspensions.

Alexander Meyer
University of Delaware

Date submitted: 30 Nov 2005 Electronic form version 1.4