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Microrheology of colloidal dispersions ROSEANNA ZIA, JOHN BRADY, California Institute of Technology — Dilute and concentrated colloidal dispersions are studied via nonlinear microrheology in the presence of excluded volume and hydrodynamic interactions via Stokesian dynamics simulation. In nonlinear microrheology, the motion of a Brownian probe is tracked as it is driven by an external force through the suspension. Mean probe motion defines the microviscosity by application of Stokes' drag law; probe fluctuations due to collisions give rise to force-induced diffusion. Together, these two quantities define the particle stress, from which the normal stress differences and osmotic pressure are obtained. Rheological properties depend strongly on the deformed microstructure, which in turn depends on the strength with which it is driven from equilibrium by the probe, as given by the Peclet number - the strength of probe forcing compared to thermal forces: Pe=Fb/kT, where kT is the thermal energy and b the bath particle size. Hydrodynamic interactions strongly influence this structure, modulating the force-induced diffusion and giving rise to force-thickening at large Pe, thus altering the effects of viscous stress at Pe>>1.

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