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Sticky-probe active microrheology DEREK HUANG, ROSEANNA ZIA, Cornell University — We study the strongly nonlinear flow behavior of a sticky colloidal dispersion via active microrheology, where the motion of a Brownian probe driven by external forces through the suspension is tracked to infer material properties. Most prior work focused on repulsive hard spheres and the influence of Brownian and hydrodynamic forces on rheological behavior, but in many biological suspensions, particles exert attractive forces on one another. Previous attempts to model the effects of particle attractions on sheared suspensions show that interparticle attractions increase suspension stress and viscosity, but these results are limited to weak shearing flows in macroscopic systems. In our microrheological model, probe motion through the suspension distorts the configuration of particles; the Péclet number, probe forcing compared to thermal forces, gives the extent of this distortion. The equilibrium microstructure and its distortion under probe forcing are also influenced by the strength of interparticle attractions relative to thermal forces. We determine the equilibrium and non-equilibrium microstructure and examine the forcing and attraction contributions to particle motion and suspension stress.

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