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Dual-probe active microrheology BENJAMIN DOLATA, ROSEANNA N. ZIA, Cornell University — Microrheology has revolutionized the study of microscopically small systems, whereby a Brownian probe particle is monitored as it travels through a complex fluid and its motion is tracked to infer properties of the embedding medium. A range of applications enables study of various materials and flow regimes: in passive microrheology probe diffusion is related to linear viscoelastic properties via a Stokes-Einstein relation, but precludes study of networked materials. Dual-probe passive microrheology overcomes this limitation in some cases. *But these techniques are restricted to linear-response properties.* In *active* microrheology a probe is driven through the medium, and reveals *strongly non-equilibrium* rheology, but is limited to dispersed systems. We have developed a new model for the microscale interrogation of general complex fluids: *Dual-probe Active Microrheology.* Via a combination of asymptotic and numerical solutions to the Smoluchowski equation, we have computed the microstructural and rheological response of a colloidal dispersion to the motion of two probes driven with forces ranging from strong to weak, at arbitrary separations and orientations to their lines of centers. The interactive force between the probes and the colloids reveals a novel non-equilibrium repulsive interaction which we connect to nonlinear rheology.

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