

Abstract Submitted
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Using Micron-Sized Ellipsoids as a New Tool for Microrheology

DAVID KILGORE, KENNETH W. DESMOND, ERIC R. WEEKS, Emory University — It is a well-established principle that the viscosity of a fluid can be calculated by observing the diffusion of microspheres, provided the diameter of the microspheres is known. We are developing a microrheology technique using ellipsoids, where the rheology can be measured without prior knowledge of the length and width of the ellipsoid. The advantage of using ellipsoids is that their asymmetry allows for the diffusion to be decomposed into two translational motions and one rotational motion. For each of these diffusive motions, we can measure a diffusion constant and relate the constant to the three unknowns: the length and width of the ellipsoid, and the viscosity. By measuring the three diffusion constants, we can determine the three unknowns. To verify this technique, we produce ellipsoids in the lab and suspend them in a viscous solution for three-dimensional imaging of the diffusion with a confocal microscope. We are able to get good agreement between the microrheological measurements and macroscopic viscosity measurements.

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