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A Quantitative Study of Bulk Stresses in Nonlinear Microrheology RYAN DEPUIT, TODD SQUIRES, University of California, Santa Barbara — We investigate the nonlinear microrheology of a simple model system - a spherical probe translating through a dilute suspension of rigid rods - to elucidate a variety of issues inherent in the interpretation of nonlinear microrheology. We have developed a computational system to quantitatively examine the issues present in interpretation of nonlinear microrheology, as originally discussed by Squires (Langmuir, 2008). Following recent work emphasizing the importance of the microstructural behavior in the bulk (Sriram et. al, 2009), we focus our attention on the bulk microstructural deformation, and examine the significance of its (Lagrangian) transient nature, as well as the consequences of the mixed and inhomogeneous flows inherent to nonlinear microrheology. From this quantitative study, we pose solutions for the current theoretical issues facing nonlinear microrheology in interpretation and comparison of the microviscosity with the shear viscosity from traditional bulk rheometry.

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