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Measurement of monolayer viscosity using non-contact microrheology ALEX LEVINE, ARTHUR EVANS, UCLA, ROIE SHLOMOVITZ, University of Washington, THOMAS BOATWRIGHT, MICHAEL DENNIN, UCI — Microrheological studies of phospholipid monolayers, bilayers, and other surfactant monolayer systems present a particularly useful avenue for studying the flow properties of fragile, complex fluid systems. Unfortunately, in some cases microscopic particle tracking methods disagree with macroscopic flow methods by several orders of magnitude. This "missing modulus" problem has been speculated to originate in the heterogeneity of the monolayer under study, as well as the unknown boundary conditions and uncertainty in particle position intrinsically associated with coupling the tracer bead to the monolayer. In this talk we discuss an alternative method for performing microrheology experiments, where the tracer bead is submerged a known depth beneath the monolayer. Using both theory and experiment, we demonstrate that despite the weaker coupling between the tracer and the monolayer, the well-characterized hydrodynamics between the bulk sub-phase and the surface allows for the calculation of particle response functions and recovery of the "missing modulus" for several model monolayer systems.

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