

Abstract Submitted
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DPPC: Is it ever Newtonian? AMIR SADOUGHI, AMIR HIRSA, Rensselaer Polytechnic Institute, JUAN LOPEZ, Arizona State University — Understanding the intrinsic properties of lung surfactant constituent components is important for a scientific foundation and predictive models. The three major interfacial properties affecting the hydrodynamics are surface tension, surface shear viscosity μ^s , and surface dilatational viscosity κ^s . At small scales such as in the alveoli, the effects of the interfacial viscosities are comparable to those of surface tension gradients. The surface tension can be determined reliably using a variety of methods. There are also several techniques that lead to consistent measurements of surface shear viscosity. Recently, for DPPC (the most prevalent constituent of lung surfactant), Newtonian behavior was demonstrated for several monolayer phases, and non-Newtonian flow documented for other phases. On the other hand, the surface dilatational viscosity is difficult to quantify, and no systematic measurements have been reported. We utilize a free-surface cavity with fixed sidewalls and oscillatory driven floor to measure the response of the monolayer. The sum $\mu^s + \kappa^s$ is deduced from comparisons between the experiments and Navier-Stokes computations with Boussinesq-Scriven surface model. Subsequently, the independent measurements of μ^s are used to isolate κ^s .

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