

A New Instrument for Interfacial Dilational Rheology

Yun-Han Huang¹, John M. Frostad¹

¹University of British Columbia, Vancouver, Canada

ABSTRACT

Viscoelastic properties of interface are believed to be important to the stability of foams and emulsions. They also directly influence the functionality of important biological systems, such as the tear film on eyes and alveoli in the lungs. Despite the importance of interfacial rheology, the measurement techniques and mathematical models needed to understand it are still insufficient. In particular, methods for measuring interfacial dilational rheology are still not standardized and there are drawbacks to the instruments commonly used. Here we present a novel design for an interfacial dilational rheometer that can generate purely dilational deformation on a planar interface, which avoids mixed deformations present in other instruments, at frequencies up to approximately 1 Hz and dilational strains down to below 0.001. We verify the rheometer with the measurement of compression isotherm of stearic acid and demonstrate its ability to measure dilational moduli of both soluble and insoluble surfactants.