Abstract Submitted
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On the Measurement of Longitudinal Interfacial Waves and Surfactant Dynamic Properties[1] N. WASHUTA, X. LIU, University of Maryland, G.M. KORENOWSKI, Rensselaer Polytechnic Institute, J.H. DUNCAN, University of Maryland — The behavior of longitudinal interfacial waves at a surfactant-laden air-water interface is studied experimentally. The waves are generated in a glass tank (4.5 cm deep, 17.8 cm wide, and 75 cm long) by horizontal oscillation of a thin Teflon barrier, which spans the width of the tank. Local surfactant concentration is measured instantaneously and non-intrusively by using a nonlinear optical method called Second Harmonic Generation (SHG). In this method, a laser pulse with a wavelength of 532 nm is reflected off of the free surface at a 60-degree angle. The reflected beam contains both the original wavelength of 532 nm and its second harmonic, 266 nm. The ratio of the intensity of the reflected 266-nm signal to the 532-nm signal is proportional to the square of the local surfactant concentration at the interface. This SHG signal is recorded at a range of distances from the barrier for several barrier-oscillation frequencies and the resulting data is used to determine the wavelengths, phase speeds and amplitude decay rates of the longitudinal waves. Applying the linear theory of longitudinal waves, these wave propagation characteristics are then used to determine the dynamic properties of the surfactant.

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