Abstract Submitted
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Measurements of longitudinal surface waves in a soluble surfactant solution[1] N. WASHUTA, X. LIU, University of Maryland, G.M. KORENOWSKI, Rensselaer Polytechnic Institute, J.H. DUNCAN, University of Maryland — Longitudinal wave trains generated at a surfactant-laden air-water interface are studied experimentally. The experiments are performed in a glass tank that is 75 cm long, 17.8 cm wide, and 4.5 cm deep. Longitudinal waves are generated using a Teflon barrier that spans the width of the tank and oscillates horizontally in the long direction of the tank. The local instantaneous surfactant concentration is measured non-intrusively 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 an incident angle of 60 degrees. Due to nonlinear optical effects, the reflected beam contains light with wavelengths of both 532 nm and its second harmonic, 266 nm. The ratio of the intensity of the 266-nm light to the 532-nm light is proportional to the concentration of surfactant on the surface. By measuring the local surfactant concentration versus time at a number of distances from the oscillating barrier, the wavelengths of the longitudinal waves are determined. The relationship between the surface dynamic properties of the surfactant and the measured dispersion relationship of the longitudinal waves is discussed.

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