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Measuring the dispersion relation of stabilized Faraday waves using Bragg scattering. PAUL W. FONTANA, MASON BROWN, EILEEN FLESHER, Seattle University — Parametrically excited surface waves, or Faraday waves, are produced on the free surface of a liquid that is vibrated vertically above a critical amplitude. Unlike standing waves, Faraday waves are composed of collections of oscillating solitons, or "oscillons." These oscillons are generally subject to random motion, but they can be stabilized into a robust square crystalline lattice by dissolving a small amount of a protein, bovine serum albumen (BSA), in the liquid medium. In the experiments presented here, we demonstrate the use of grazing incidence Bragg scattering to measure the lattice spacing of the Faraday wave crystal, and hence the dominant wave number of the Faraday wave. Visible laser light (543.5 nm) is reflected off stabilized Faraday wave crystals at grazing incidence, producing an interference pattern in the far field. Analysis of the interference pattern yields the wave number to high precision and also brackets the wave height. The wave number was measured for driving frequencies from 200 Hz to 900 Hz. The resulting dispersion relation is compared with that of gravity-capillary waves in the same medium. Applications of the Faraday wave crystal as a liquid-based, tunable 2D diffraction grating are being explored.

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