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Development of a Thin-Film Rheometer[1] CLAIRE OLNEY, NATHAN KEIM, JAMESON JEWELL, MARA NIESYT, DANI MEDINA, Physics, California Polytechnic State University, San Luis Obispo, XIANG CHENG, Chemical Engineering and Materials Science, University of Minnesota Twin Cities
— We report progress in developing a thin-film rheometer, a device used to investigate the characteristics of a freely suspended film of liquid by shearing it. The design will allow sensitive measurements and imaging of complex fluids, such as bacterial suspensions. To gather data we suspend a magnetized needle in the film and move it with an oscillating magnetic field to shear the liquid. By measuring the phase difference between the forcing current and the motion of the needle, we can extract information about the properties of the liquid, such as the viscosity. Using this principle we show a proof-of-concept measurement of the viscosity of water. By tracking particles suspended in the fluid, we find that in our current prototype the needle does not cause a simple shear in the fluid, and we will describe the implications this has for future designs of the rheometer.

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