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Rayleigh-Taylor instability for immiscible fluids of arbitrary viscosities: Magnetic levitation investigation and theoretical model¹ CHARLES ROSENBLATT, ZHIBIN HUANG, Department of Physics, Case Western Reserve University, GIOVANNI CARBONE², Department of Physics, Case Western Reserve University, PIERRE CARLES, Laboratoire de Modelisation en Mecanique, CNRS, Universite Paris 6, France — A magnetic field gradient was used to draw down a low density paramagnetic fluid below a more dense fluid in a Hele-Shaw cell. On turning off the field a Rayleigh-Taylor instability was observed in situ, and the growth of the most unstable wavevector was measured vs. time. A theory for the instability that permits different viscosities for two immiscible fluids was developed, and good agreement was found with the experimental results. The technique of magnetic levitation promises to broaden significantly the accessible parameter space of gravitational interfacial instability experiments.

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Charles Rosenblatt Department of Physics, Case Western Reserve University

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