

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Experimental study of Rayleigh-Taylor Instability utilizing a paramagnetic liquid combination OMID GOHARDANI, REBECCA OEMKE, JEFFREY JACOBS, University of Arizona — An experimental study of Rayleigh-Taylor instability is presented that utilizes the properties of a magnetic liquid. A gravitationally unstable miscible combination of a paramagnetic salt solution and one of two nonmagnetic solutions is stabilized by exposing it to a magnetic field gradient. Both liquids are contained within a Plexiglas tank positioned between the poles of a large electromagnet. The suspension of the heavy paramagnetic fluid over the lighter non-magnetic one is attained by a magnetic field gradient produced by the contoured pole caps of the electromagnet. Rayleigh-Taylor Instability commences with the rapid removal of power to the electromagnet resulting in the heavy fluid falling under gravitational influence. The resulting instability is visualized utilizing planar laser-induced fluorescence and back-lit photography. Experiments initiated with an apparent flat interface evolve into a random surface pattern with the dominant length scale approximated by the fastest growing wavelength as given by viscous linear stability theory. The mean mixing zone width measurements exhibit an αAgt^2 dependence with the value of α in agreement with previous experiments.

Jeffrey Jacobs
University of Arizona

Date submitted: 03 Aug 2007

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