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Experimental study of Rayleigh-Taylor instability using magnetic liquids. PEDRO ROMERO-COLIO, REBECCA OEMKE, JEFFREY JACOBS, University of Arizona — Novel experiments are presented that utilize the properties of paramagnetic fluids to study Rayleigh-Taylor instability. The fluids, a miscible combination of paramagnetic salt solution and one of three nonmagnetic solutions, are contained in a tank placed between the poles of a large electromagnet. The magnetic field generated is capable of suspending the heavy paramagnetic fluid over the lighter non-magnetic fluid utilizing the gradient field principle. Rayleigh-Taylor instability is initiated by rapidly removing power to the electromagnet which results in the heavy fluid falling under the gravitational influence. The resulting instability is visualized using back-lit photography. Experiments initiated with an apparently flat initial interface develop into a random surface pattern with dominant length scale well approximated by the fastest growing wavelength given by viscous linear stability theory. Measurements of the mean mixing zone width posses an $\alpha A g t^2$ dependence with a value of α in agreement with previous experiments.

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