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Experimental study of Atwood number effects on the single-mode Rayleigh-Taylor instability JEREMY WHITE, JASON OAKLEY, MARK ANDERSON, RICCARDO BONAZZA, University of Wisconsin - Madison — The growth of Rayleigh-Taylor (RT) spikes are studied experimentally for a single-mode, 2D initial condition. The experiments are performed using a magnetorheological (MR) fluid, composed of 4.5 micron spherical iron particles suspended in hexane with a small amount of oleic acid used as a surfactant. This mixture is suspended over aqueous salt solutions to achieve different Atwood number fluid pairs between 0.2 and 0.5. A discontinuous, membrane-less, and initially static interface is created by magnetically immobilizing the MR fluid while resting over ice of a prescribed shape. This technique results in a well defined initial perturbation. The temporal growth of the spikes is observed with a back-lit, high speed imaging system, and growth rates obtained from these experiments are compared with published analytical, experimental, and numerical results. The transition from linear to nonlinear growth is also examined and compared with analytical predictions using the approach attributed to Fermi by Layzer.

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