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Experimental study of Rayleigh-Taylor instability at moderate to high Atwood numbers JEREMY WHITE, JASON OAKLEY, MARK ANDERSON, RICCARDO BONAZZA, University of Wisconsin-Madison — The Rayleigh-Taylor instability is studied experimentally at a moderate Atwood number of 0.46 and a high Atwood number of ~ 1. Two 2-D single mode sinusoidal initial conditions are examined: a single wavelength protruding from a flat interface and a periodic waveform, both with the same initial amplitude and wavelengths. 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. A discontinuous, membrane-less, and initially static interface is created by magnetically immobilizing the MR fluid with the desired shape on the interface, which is then coupled with either water or air, depending on the desired Atwood number. The resulting well defined interface shape can be quickly released by removal of the magnetic field, allowing the instability to develop. The temporal growth of the bubbles and spikes is observed with a high speed X-Ray radiography system. The late time growth rates obtained from these experiments are compared with published analytical, experimental, and numerical results.

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