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Miscible and immiscible experiments on the Rayleigh-Taylor instability using planar laser induced fluorescence visualization MATTHEW MOKLER, MICHAEL ROBERTS, JEFFREY JACOBS, The University of Arizona — Incompressible Rayleigh-Taylor instability experiments are presented in which two stratified liquids having Atwood number of 0.2 are accelerated in a vertical linear induction motor driven drop tower. A test sled having only vertical freedom of motion contains the experiment tank and visualization equipment. The sled is positioned at the top of the tower within the linear induction motors and accelerated downward causing the initially stable interface to be unstable and allowing the Rayleigh-Taylor instability to develop. Forced and unforced experiments are conducted using both immiscible and miscible liquid combinations. Forced initial perturbations are produced by vertically oscillating the test sled prior to the start of acceleration. The interface is visualized using a 445nm laser light source that illuminates a fluorescent dye mixed in one of the fluids. The resulting fluorescent images are recorded using a monochromatic high speed video camera. The laser beam is synchronously swept across the fluorescent fluid, at the frame rate of the camera, exposing a single plane of the interface allowing for the measurement of spike and bubble growth. Comparisons between miscible and immiscible mixing layer distributions are made from the resulting interface concentration profiles.

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