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Miscible and immiscible liquid experiments and simulations on the Rayleigh-Taylor instability MICHAEL ROBERTS, MATTHEW MOKLER, University of Arizona, WILLIAM CABOT, Lawrence Livermore National Laboratory, JEFFREY JACOBS, University of Arizona — Experiments and numerical simulations are presented in which an incompressible system of two liquids is accelerated to produce the Rayleigh-Taylor instability. In these experiments, the initially stable, stratified liquid combination is accelerated downward on a vertical rail system in one of two experimental apparatuses: an apparatus in which a system of weights and pulleys accelerates the liquid filled tank (which is affixed to a test sled), or a new apparatus which uses linear induction motors to accelerate the tank (which is attached to an aluminum plate) to produce much greater acceleration levels. Both miscible and immiscible liquid combinations are used. In both apparatuses the resulting fluid flows are visualized with backlit imaging using LED backlights in conjunction with monochrome high-speed video cameras, both of which travel with the moving fluid filled containers. Initial perturbations are either unforced and allowed to progress from background noise or forced by vertically oscillating the liquid combination to produce parametric internal waves. The results of these experiments are compared to numerical simulations performed using the CFD code Miranda.

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