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Experiments on the expansion wave driven Rayleigh-Taylor instability ROBERT MORGAN, OLEG LIKHACHEV, JEFFREY JACOBS, The University of Arizona — Experiments are presented in which a diffuse interface between two gases is accelerated to generate the Rayleigh-Taylor instability. The initially flat interface is generated by the opposing flow of two test gases at matched volumetric flow rates exiting through small holes in the test section. This interface is then accelerated by an expansion wave generated by the rupturing of a diaphragm separating the heavy gas from a tank evacuated to $\sim$ 0.1atm. The expansion wave generates a very high, O(1e3g0), but non-constant acceleration acting on the interface causing the Rayleigh-Taylor instability to develop. Planar Mie scattering is employed using a planar laser sheet generated at the top of the apparatus, which illuminates smoke seeded in in a small amount of air in the heavy gas. Scattered light is then imaged using a CMOS camera operating at 12 kHz. Shadowgraphy is also used to visualize the instability using 200 mm diameter f/6.0 parabolic mirrors along with three CMOS cameras operating at 10 kHz with exposure times of 1e-6s. Perturbations are introduced by either horizontally or vertically oscillating the fluid interface to generate single-mode or random-mode perturbations respectively. Instability amplitude and growth rates are extracted and will also be presented.

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