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Results from the NIF Re-Shock platform for studying Rayleigh-Taylor and Richtmyer-Meshkov instabilities in a planar geometry[1] SABRINA R. NAGEL, CHANNING M. HUNTINGTON, JASON D. BENDER, KUMAR S. RAMAN, TED BAUMANN, STEPHAN A. MACLAREN, SHON PRISBREY, YE K. ZHOU, Lawrence Livermore National Laboratory — We present results from experiments at the National Ignition Facility (NIF) studying the nonlinear Richtmyer-Meshkov and Rayleigh-Taylor instabilities of a multiply-shocked plasma interface in a planar geometry. Compared to "re-shock" experiments in classical shock tubes, laser-driven systems present new opportunities to precisely vary a range of parameters, including the initial perturbation of the unstable interface, the densities of the mixing materials, and the strengths of the shockwaves. In our experiments we have used this flexibility to obtain data for different re-shock strengths, and Atwood numbers. The platform further includes the ability to diagnose both the extent of the penetration of the heavy fluid into the light fluid as well as the light fluid into the heavy, which aids with the accuracy of the mix width measurement. We present a comparison of the effect of the various experimental conditions on the observable mix width in both, our data from the NIF experiments, and the hydrodynamics simulations that have been developed to simulate these experiments.

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