Abstract Submitted
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Large eddy simulation of hydrodynamic instability growth in doubly-shocked plasmas at the National Ignition Facility[1] JASON BENDER, KUMAR RAMAN, BRITTON OLSON, STEPHAN MACLAREN, CHANNING HUNTINGTON, SABRINA NAGEL, Lawrence Livermore National Laboratory — Richtmyer-Meshkov and Rayleigh-Taylor hydrodynamic instabilities play important roles in the behavior of high-energy-density (HED) plasmas, such as those considered in inertial confinement fusion research. Recent experiments at the National Ignition Facility have investigated instability growth at the irregular interface between two different-density fluids, following the impingement of two X-ray-driven shock waves. We discuss recent large eddy simulations of these "re-shocked" plasmas, with a focus on accurately modeling transition to turbulence. Various profiles are considered for the initial perturbation to the interface between the two fluids, including both sinusoidal (i.e., single-mode) and multimode profiles. We characterize nonlinear instability growth and turbulent-mixing-layer development in the simulations, and we compare our results with experimental data and with predictions from simple Reynolds-averaged Navier-Stokes models that are commonly employed to treat HED hydrodynamic turbulence.

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