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Design study for a diverging supernova explosion experiment on NIF[1] MARKUS FLAIG, TOMASZ PLEWA, Florida State University, PAUL KEITER, MICHAEL GROSSKOPF, CAROLYN KURANZ, PAUL DRAKE, University of Michigan, HYE-SOOK PARK, Lawrence Livermore National Laboratory — We report on design simulations of a spherically-diverging, multi-interface, supernova-relevant Rayleigh-Taylor experiment (DivSNRT) to be carried out at the National Ignition Facility (NIF). The simulations are performed in two and three dimensions using the block-adaptive, multi-group radiative diffusion hydrodynamics code CRASH and the FLASH-based MHD code Proteus. In the present study, we concentrate mainly on a planar variant of the experiment. We assess the sensitivity of the Rayleigh-Taylor instability growth on numerical discretization, variations in the laser drive energy and the manufacturing noise at the material interfaces. We find that a simple buoyancy-drag model accurately predicts the mixed-layer width obtained in the simulations. We use synthetic radiographs to optimize the diagnostic system and the experimental setup. Finally, we perform a series of exploratory MHD simulations and investigate the self-generation of magnetic fields and their role in the system evolution.

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