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NIF laboratory astrophysics simulations investigating the effects of a radiative shock on hydrodynamic instabilities[1] A.A. ANGULO, C.C. KURANZ, R P. DRAKE, University of Michigan, C. M. HUNTINGTON, H. -S. PARK, B.A. REMINGTON, D. KALANTAR , S. MACLAREN, K. RAMAN, A. MILES, MATTHEW TRANTHAM, Lawrence Livermore National Laboratory, J.L. KLINE, K. FLIPPO, F.W. DOSS, Los Alamos National Laboratory, D. SHVARTS, Nuclear Research Center — This poster will describe simulations based on results from ongoing laboratory astrophysics experiments at the National Ignition Facility (NIF) relevant to the effects of radiative shock on hydrodynamically unstable surfaces. The experiments performed on NIF uniquely provide the necessary conditions required to emulate radiative shock that occurs in astrophysical systems. The core-collapse explosions of red supergiant stars is such an example wherein the interaction between the supernova ejecta and the circumstellar medium creates a region susceptible to Rayleigh-Taylor (R-T) instabilities. Radiative and nonradiative experiments were performed to show that R-T growth should be reduced by the effects of the radiative shocks that occur during this core-collapse. Simulations were performed using the radiation hydrodynamics code Hyades using the experimental conditions to find the mean interface acceleration of the instability and then further analyzed in the buoyancy drag model to observe how the material expansion contributes to the mix-layer growth.

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