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Formation and Evolution of Fluid Instabilities in Double Shell Capsule Implosions using 2D Hydrodynamic Simulations with Surface Roughness IRINA SAGERT, R. SACKS, D. STARK, J. P. SAUPPE, E. LOOMIS, D. MONTGOMERY, B. HAINES, P. KEITER, S. PALANIYAPPAN, Los Alamos National Laboratory, P. AMENDT, Lawrence Livermore National Laboratory, H. XU, H. HUANG, General Atomics, T. CARDENAS, S. FINNEGAN, J. KLINE, Los Alamos National Laboratory — We study the formation and development of fluid instabilities in Double Shell capsule implosions via computational fluid dynamics simulations. In 1D simulations, we perform a systematic study regarding the role of the capsule's foam cushion, its density and material, where, for the latter, we use CH and SiO2 foam. In addition, we test the impact of Cr dopant in the Be tamper. These studies, which determine the Atwood numbers at the capsule material interfaces throughout the implosion, are followed up by 2D simulations with the hydrodynamics codes xRAGE and Hydra. We compare the outcomes of both codes in regard to the time evolution of Rayleigh-Taylor and Richtmyer-Meshkov instabilities that develop as a consequence of including experimentally obtained surface roughness spectra on the capsule's shells. Finally, we determine Reynolds numbers in Double Shell capsule implosions and evaluate the possible formation and role of turbulence in the fuel.

Irina Sagert
Los Alamos National Laboratory

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