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Understanding Radiative Shock Propagation Through Porous Media with Simulation and Experiment LAUREN GREEN, B. HAINES, S. JONES, Y. KIM, P. KOZLOWSKI, T. MURPHY, Los Alamos National Laboratory — The quest for controlled fusion energy has been ongoing for over a half century. The attraction of inertial confinement fusion (ICF) is the enormous energy that is potentially available in fusion fuels and the view of fusion as a safe, clean energy source. Understanding how the development of material mixing impacts thermonuclear reaction rates is of particular importance to achieving energy gain in ICF. The MARBLE campaign at Los Alamos National Laboratory (LANL) is a series of ICF experiments employing plastic foams with engineered macro-pores designed to investigate heterogeneous material mixing during laser driven shock implosions. Accurately modeling the dynamics of these foams is challenging for radiation-hydrodynamics codes due to the complex geometry that stresses multi-material modeling of equation of state (EOS) opacity, thermal conduction, and thermonuclear burn. We employed xRAGE, a LANL Eulerian radiation-hydrodynamics code, to perform the simulations and study the material effects and shock propagation in comparison with the results of companion MARBLE Void Collapse experiments performed on the OMEGA laser at the Laboratory for Laser Energetics (LLE). Our simulations are in good agreement with the experimental shock wave speeds. We will present the conditions necessary for accurate simulation of these experiments and discuss modeling implications.

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