Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Modeling Shock Wave Speed in MARBLE Foam DOUGLAS WOODS, BRIAN HAINES, YONGHO KIM, PAWEL KOZLOWSKI, THOMAS MURPHY, BRIAN ALBRIGHT, CARLOS DI STEFANO, THOMAS DAY, TANA CARDENAS, DANIEL BARNAK, RICK OLSON, MARK GUNDERSON, MELISSA DOUGLAS, Los Alamos National Laboratory — The MARBLE campaign at Los Alamos National Laboratory (LANL) is a series of separated reactant ICF experiments employing plastic foams with engineered macro-pores designed to investigate heterogeneous material mixing during spherical implosions. We discuss the results of companion MARBLE Void Collapse experiments performed on OMEGA. These experiments were designed to validate the radiation-hydrodynamics modeling of shock propagation through foams with macropores. Foam-filled shock tubes were directly-driven by lasers on one end with x-ray radiographs generated at various times, enabling the direct measurement of shock speed, shock front shape, and shock/interface dynamics, which is not possible in a spherically convergent geometry. The pore sizes were varied to investigate the effects on shock speed. Additionally, the effect of neopentane fill gas on shock speed was investigated. We employed xRAGE, a LANL Eulerian radiation-hydrodynamics code, to perform the simulations and study the material effects. Our simulations are in good agreement with the experiments. We present the conditions necessary for accurate simulation of these experiments and discuss modeling implications.

Douglas Woods
Los Alamos National Laboratory

Date submitted: 01 Jul 2019 Electronic form version 1.4