Abstract Submitted
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Design and analysis of laser shock wave equation-of-state experiments on low-Z materials[1] R. LONDON, A. LAZICKI, J. CASTOR, G. COLLINS, J. NILSEN, F. COPPARI, D. ERSKINE, D. FRATANDUONO, J. HAWRELIAK, M. MORALES-SILVA, H. WHITLEY, Lawrence Livermore National Laboratory — The equation-of-state (EOS) of low-Z materials is important for inertial confinement fusion, planetary astrophysics, and high energy density physics. Lithium hydride is both technologically important and a common benchmark for theoretical models. Experimental data at pressures above 3 Mbar was lacking, resulting in uncertainty in the high pressure EOS. Experiments at the Omega Laser Facility are being pursued to study the EOS at higher pressures. The experiments use the impedance matching technique, in which the EOS is determined from VISAR measurements of a laser-generated shock wave propagating into a LiH sample from a quartz reference. Modeling of the laser-target interaction and shock propagation using the HYDRA radiation-hydrodynamic computer program is described. We use the results to specify parameters such as the composition and thicknesses of various target layers and the laser pulse profiles. The role of x-ray and hot electron preheat on the propagation of the shock wave and the VISAR beam are described. Results are presented for the EOS of LiH between 2.5 and 10.5 Mbar. The results are compared to previous experimental data, tabulated models, and recent quantum molecular dynamics calculations.

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