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Multiple Spherically Converging Shock Waves in Liquid Deuterium T.R. BOEHLY, V.N. GONCHAROV, S.X. HU, T.J.B. COLLINS, J.A. MAROZAS, T.C. SANGSTER, D.D. MEYERHOFER, Laboratory for Laser Energetics, U. of Rochester, M.A. BARRIOS, D.E. FRATANDUONO, P.M. CELLIERS, D.G. HICKS, G.W. COLLINS, LLNL — High-performance ICF target designs use multiple shocks to condition the shell before it is imploded. Accurate timing of these shocks is critical to target performance. We report on experiments on the OMEGA Laser System using directly driven spherical targets filled with liquid deuterium where up to four spherically converging shocks were observed and timed. This technique is the basis for tuning campaigns performed at the National Ignition Facility. The measured shock-velocity profiles exhibit the effects of spherical convergence (pressure increase with decreasing radius) and very high shock velocities (135 km/s). Simulations of these experiments accurately model the shock velocities and timing when a nonlocal electron-transport model is used for heat conduction. The self-emission from these shocks provides the temperature of deuterium shocked to 1 to 5 Mbar. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

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