Abstract Submitted
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Multi-Mbar Ramp Compression of Copper[1] RICK KRAUS, Lawrence Livermore National Laboratory, JEAN-PAUL DAVIS, CHRISTOPHER SEAGLE, Sandia National Laboratory, DAYNE FRATANDUONO, DAMIAN SWIFT, JON EGGERT, GILBERT COLLINS, Lawrence Livermore National Laboratory — The cold curve is a critical component of equation of state models. Diamond anvil cell measurements can be used to determine isotherms, but these have generally been limited to pressures below 1 Mbar. The cold curve can also be extracted from Hugoniot data, but only with assumptions about the thermal pressure. As the National Ignition Facility will be using copper as an ablator material at pressures in excess of 10 Mbar, we need a better understanding of the high-density equation of state. Here we present ramp-wave compression experiments at the Sandia Z-Machine that we have used to constrain the isentrope of copper to a stress state of nearly 5 Mbar. We use the iterative Lagrangian analysis technique, developed by Rothman and Maw, to determine the stress-strain path. We also present a new iterative forward analysis (IFA) technique coupled to the ARES hydrocode that performs a non-linear optimization over the pressure drive and equation of state in order to match the free surface velocities. The IFA technique is an advantage over iterative Lagrangian analysis for experiments with growing shocks or systems with time dependent strength, which violate the assumptions of iterative Lagrangian analysis.

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