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Shock compression of D2 to 500 GPa along the principal Hugoniot
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BOEHLY, Laboratory for Laser Energetics — Impedance-match measurements
along the principal Hugoniot of deuterium using an Al standard were carried out
about 10 years ago at the OMEGA and the Z facilities. The data at the highest
pressures (near 200 GPa) suggest a systematically softer response than current
equation of state (EOS) models, although the measurement uncertainties are too
large to confirm a disagreement with the models. More recent data sets from shock
timing experiments on the National Ignition Facility for the inertial confinement
fusion program, and a reanalysis of old OMEGA data to extract the sound speed
suggest that the deuterium Hugoniot may indeed be softer than the models pre-
dict above 150 GPa. We have investigated this issue with recent experiments at
the OMEGA laser facility, and we present new impedance-match data along the
deuterium principal Hugoniot in the 250-500 GPa range obtained with higher mea-
surement accuracy using quartz as the impedance match standard. This work was
performed under the auspices of the U.S. Department of Energy by LLNL under
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