

Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Thermodynamic and Optical Response of Multiply Shocked Liquid Nitromethane B.M. FLANDERS, J.M. WINEY, Y.M. GUPTA, Washington State Univ — To investigate the thermodynamic and optical response of multiply shocked liquids, particle velocity profiles were measured for liquid nitromethane (NM) subjected to stepwise loading to a peak pressure of 10 GPa. Using a multi-point velocity interferometer (VISAR), wave profiles were obtained at both the front and rear interfaces of the thin (200 μm) liquid sample to obtain data regarding the thermodynamic response and the refractive index at the intermediate stepwise loading states, in addition to the peak state. Changes in the apparent velocity at the front sample interface were well accounted for by using a Gladstone-Dale relationship to describe the NM index of refraction. The thermodynamic states of multiply shocked NM were examined by comparing the measured wave profiles to those calculated using a published NM equation of state [Winey, et al., J. Chem. Phys. 113, 7492 (2000)]. Although the calculated and measured particle velocity states are in good overall agreement, comparison of the calculated shock wave reverberation times at the front and rear sample interfaces with the measured values suggests that the published NM equation of state can be improved. Work supported by DOE/NNSA.

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Date submitted: 28 Jan 2015

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