

Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Shock Wave Response of an Insensitive High Explosive: Wave Profiles and Continuum Model for FOX-7 Single Crystals¹ J. M. WINEY, Y. TOYODA, Y. M. GUPTA, Washington State University — Despite a strong and growing interest in using insensitive high explosives (IHE), experiments to determine the shock wave response of IHE single crystals have not been reported. To address this need, plate impact experiments were conducted to measure wave profiles in FOX-7 (1,1-diamino-2,2-dinitroethylene) single crystals shocked to 21 GPa longitudinal stresses. Particle velocity histories at the FOX-7/LiF window interface, measured using laser interferometry, show a clear two-wave structure at modest stresses (<6 GPa). Wave profiles at higher stresses show an overdriven single wave. The measured profiles to 21 GPa show no sign of energy release due to chemical decomposition. Measured shock velocities and wave profiles provide accurate Hugoniot data to 21 GPa. Wave profiles calculated using a thermo-mechanical material model for shocked FOX-7 provide a good match to the measured profiles. The material model also enables reasonable estimates of temperatures in the shocked states. The FOX-7 results presented here will be compared with results obtained previously for more conventional HE crystals, such as PETN and RDX.

¹Work supported by ONR and DOE/NNSA

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Date submitted: 28 Feb 2019

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