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Modeling compressive reaction and estimating model uncertainty in shock loaded porous samples of Hexanitrostilbene (HNS) AARON BRUNDAGE, Sandia National Laboratories, JARED GUMP, Naval Surface Warhead Center - Indian Head Division — Neat pressings of HNS powders have been used in many explosive applications for over 50 years. However, characterization of its crystalline properties has lagged that of other explosives, and the solid stress has been inferred from impact experiments or estimated from mercury porosimetry. This lack of knowledge of the precise crystalline isotherm can contribute to large model uncertainty in the reacted response of pellets to shock impact. At high impact stresses, deflagration-to-detonation transition (DDT) processes initiated by compressive reaction have been interpreted from velocity interferometry at the surface of distended HNS-FP pellets. In particular, the Baer-Nunziato multiphase model in CTH, Sandia's Eulerian, finite volume shock propagation code, was used to predict compressive waves in pellets having approximately a 60% theoretical maximum density (TMD). These calculations were repeated with newly acquired isothermal compression measurements of fine-particle HNS using diamond anvil cells to compress the sample and powder x-ray diffraction to obtain the sample volume at each pressure point. Hence, estimating the model uncertainty provides a simple method for conveying the impact of future model improvements based upon new experimental data.

Aaron Brundage
Sandia National Laboratories

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