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Isentropic Compression Experiments for Mesoscale Studies of Energetic Composites MELVIN BAER, CLINT HALL, Sandia National Laboratories, RICK GUSTAVSEN, DANIEL HOOKS, STEVE SHEFFIELD, Los Alamos National Laboratory, SANDIA NATIONAL LABORATORIES COLLABORATION, LOS ALAMOS NATIONAL LABORATORY COLLABORATION —
New experimental diagnostics and computational modeling provides an unprecedented means of greatly improving understanding of energetic material behavior at the mesoscale (grain or crystal level). Mesoscale simulations have revealed that mechanical loading produces wave fields are three-dimensional and unsteady and materials strongly interact in localized regions to control the sensitivity of initiation and sustained reaction. Key to this modeling is the determination of appropriate constitutive and EOS property data at extremely high stress-strain states. The Sandia Z accelerator and associated diagnostics provides new insight into the mechanical response of energetic composites via isentropic ramp-wave compression loading. In this presentation we describe a method to investigate ramp loading using Eulerian CTH shock physics analysis of the ICE experiments. This approach is applied to investigate the constituent response of PBX9501 subjected to ∼42 Kbar ramp with 300 ns duration. VISAR data reveals the averaged response of the composite material in comparison to the individual constituents including the effects of anisotropy of HMX crystals and the interactions of fine crystallites with the binder materials.

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