SHOCK17-2017-000168

Abstract for an Invited Paper
for the SHOCK17 Meeting of
the American Physical Society

Multi-shock experiments on a TATB-based composition

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Temperature based models for condensed explosive need an unreacted equation of state (EOS) that allows a realistic estimation of the temperature for a shock compression driven at detonation velocity. To feed the detonation models, we aim at exploring the high pressure shock Hugoniot of unreacted TATB composition up to 30 GPa with both hydrodynamic and temperature measurements. We performed on the gas gun facility ARES, multi-shock experiments where the first shock is designed to desensitize the explosive and inhibit the reactivity of the composition. The hydrodynamic behavior was measured via the velocity of a TATB/LiF interface with PDV probes. We attempted to measure the temperature of the shocked material via surface emissivity with a pyrometer calibrated to the expected low temperature range. Based on single shock experiments and on ab-initio calculation, we built a complete EOS for the unreacted phase of the TATB explosive. The hydrodynamic data are in good agreement with our unreacted EOS. Despite the record of multi-stage emissivity signals, the temperature measurements were difficult to interpret dur to high-luminisity phenomena pertubation.

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