Abstract Submitted
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Experimental Validation of Detonation Shock Dynamics in Condensed Explosives[1] D. SCOTT STEWART, MIE, University of Illinois, Urbana, IL, DAVID E. LAMBERT, USAFRL, Munitions Directorate, Eglin AFB, SUNHEE YOO, MIE, University of Illinois, Urbana, IL, BRADLEY L. WESCOTT, TAM, University of Illinois, Urbana, IL — Experiments in the HMX-based, condensed explosive PBX-9501 were carried out to validate a reduced, asymptotically derived description of detonation shock dynamics (DSD) where it is assumed that the normal detonation shock speed is determined by the total shock curvature. The passover experiment has a lead disk embedded in a right circular cylindrical charge of PBX-9501 and is initiated from the bottom. A range of dynamic detonation states with both diverging (convex) and converging (concave) shock shapes are realized as the detonation shock passes over the disk. The time of arrival of the detonation shock at the top surface of the charge is recorded and compared against DSD simulation and direct multi-material simulation. A new wide-ranging equation of state (EOS) and rate law is used to describe the explosive and is employed in both theory and multi-material simulation. The experiment and theory and simulation are found to be in excellent agreement.

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