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Critical Ignition Transients in Condensed Explosives D. SCOTT STEWART, SUNHEE YOO, University of Illinois, DAVID E. LAMBERT, Air Force Research Laboratory, Munition Directorate — Comparisons of the motion of a detonation shock measured in experiment, that predicted by the asymptotic theory of detonation shock dynamic (DSD-theory) that include shock acceleration, and direct multi-material simulation are made. A non-ideal, reactive equation of state and a rate law is used to describe the explosive and was employed in both the theoretical (DSD) calculations and the multi-material simulations. The experiment, theory are found to be in excellent agreement and this indicates that for a large class of important detonation flows one can use the DSD model. DSD assumes that the detonation shock propagates along its normal direction with its speed determined by its total shock curvature (D-kappa). We present a calculation of critical energies and initial conditions needed to light the explosive using theory and show comparison with experiments conducted by Lambert in HMX-based explosives.

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