

Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Shock Initiation of Hexanitrostilbene at Ultra-high Shock Pressures and Critical Energy Determination MIKE BOWDEN, MATTHEW MAISEY, AWE Plc — Hexanitrostilbene is a secondary explosive with attractive properties for detonator usage, including thermal stability, good safety properties and easy initiability. It is desirable to characterize the shock initiation of detonator explosives to enable optimization of system parameters. HNS is a suitable explosive for use in electrical and optical slapper detonators, where shock pressures generated by the flyer plates used can exceed 30 GPa. This extreme shock regime can be explored by initiating HNS with a variety of flyer thicknesses, from 3 to 25 microns at velocities of several km/s. Thresholds for optical and electrical slapper detonators were evaluated, and Photonic Doppler Velocimetry used to determine the flyer velocity at threshold. The flyer diameters are in excess of the critical diameter for HNS, allowing a one-dimensional treatment of the initiation. Calculated values for pressure and shock duration are used to evaluate the critical energy criteria $P^n\tau$. The calculated value of n is compared to published values and discussed for similar systems. The James Criterion is used to analyze the initiation, with values of E_c and Σ_c being determined from experimental data, providing a predictive capability to model other configurations such as different flyer thicknesses and materials.

Mike Bowden
AWE Plc

Date submitted: 23 Feb 2011

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