

Abstract Submitted
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Characterizing the growth to detonation in PETN and HNS with small-scale PDV cutback experiments RYAN WIXOM, COLE YARRINGTON, ROBERT KNEPPER, ALEXANDER TAPPAN, JOSEPH OLLES, MATTHEW ZELENOK, Sandia Natl Labs, A- TEAM — For many decades, cutback experiments have been used to characterize the equation of state and growth to steady detonation in explosive formulations. More recently, embedded gauges have been used to capture the growth to steady detonation in gas-gun impacted samples. Data resulting from these experiments are extremely valuable for parameterizing equation of state and reaction models used in hydrocode simulations. Due to the extremely fast growth to detonation in typical detonator explosives, cutback and embedded gauge experiments are extremely difficult, if not impossible. Using frequency shifted photonic Doppler velocimetry (PDV) we have measured particle velocity histories from explosive films impacted with electrically driven flyers. By varying the sample thickness and impact conditions we were able to capture the growth from inert shock to full detonation pressure within distances as short as 100 μm . These data were used to assess and improve burn-model parameterization and equations of state for simulating shock initiation. Additionally, we discuss details of the experiment and data analysis regarding the most accurate possible determination of the velocity spike.

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