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Oblique Plate Impact Experiments to Study the Compression-Shear Behavior of the HMX Based Explosive PBX 9501 WILLIAM REINHART, Sandia National Laboratories, RICK GUSTAVSEN, Los Alamos National Laboratory, TRACY VOGLER, SCOTT ALEXANDER, Sandia National Laboratories, TOM THORNHILL, Ktech-Raytheon, BRAD CLEMENTS, BRIAN BARTRAM, Los Alamos National Laboratory, SNL/LANL COLLABORATION —
HMX (cyclotetramethylene-tetranitramine) based explosive, PBX 9501, is a conventional high explosive formulation composed of 95% wt. of HMX and 5% binders. A series of experiments were performed to investigate one-dimensional combined pressure-shear waves in PBX-9501. This study is thought to be the first to estimate shear stress and strength in a plastic bonded high explosive. Experiments were conducted using Sandia National Laboratories oblique launcher at the Shock Thermodynamics Applied Research (STAR) facility. A projectile is keyed to a slot in the launcher barrel in order to prevent rotation. The projectile is faced with a titanium alloy plate inclined at 20 degrees to the launcher axis. The target consists of a 1 mm thick PBX 9501 disk sandwiched between two titanium alloy plates. Measurements of shear and longitudinal particle velocities were used to determine stresses and infer strength. Longitudinal stresses from 1.4 to 3.1 GPa were applied which presented corresponding shear stresses of 0.1 to 0.23 GPa at high shearing strain rates up to 0.4 x $10^5 s^{-}1$. This experimental data now provides for the first time, relevant information for model development.

William Reinhart
Sandia National Laboratories

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