Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Dynamic three-dimensional observation of corner turning in LX-17 with flash x-rays JOSEPH TRINGE, Lawrence Livermore Natl Lab, MICHAEL ZELLNER, US Army Research Laboratory, CLIFTON MORTENSEN, FRANCO GAGLIARDI, JEREL SMITH, KYLE CHAMPLEY, Lawrence Livermore Natl Lab — Detonation wave propagation in TATB-based explosives such as LX-17 is important to measure to understand explosives' performance, but the details of shock interactions with surfaces and interfaces are often inherently three dimensional. They are therefore challenging to observe with traditional diagnostics which rely on point measurements (e.g., with photonic Doppler velocimetry) or imaging with two-dimensional detectors or film. Flash x-rays are uniquely well-suited to observation of detonation phenomena due to short (˜25 ns) exposure times and the fact that x-ray contrast is correlated with spatially localized explosive density. Here we report results obtained with a few-view x-ray computed tomography (CT) approach to observe an asymmetrically-detonated LX-17 cylinder. 3D characterization of shock wave evolution is enabled by advanced reconstruction algorithms and a fifteen source multi-energy 3D flash x-ray imaging system. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC.

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Date submitted: 28 Feb 2019 Electronic form version 1.4