Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Shock Waves Formed by the Geometric Characteristics of Exploding Metal Wires WILLIAM NEAL, Atomic Weapons Establishment, NATE SANCHEZ, Los Alamos National Laboratory — Many of the models describing the explosion of metal wires rely upon the assumption that the wire explodes as a bulk, i.e.: the entire length of the wire explodes simultaneously. This study demonstrates that this is not the case within the typical energy regime used to fire exploding bridgewire (EBW) detonators. A mixture of high-resolution x-ray phase contrast radiographs and 3-dimensional magneto-hydrodynamic simulations are presented in order to shed light on mechanisms comprising the explosion of EBWs as the capacitor discharge unit (CDU) voltage is increased from the V50 threshold to all-fire. The second-order effects of wire geometry on shock-pressure, and bulk electrical resistivity, are discussed in this study. In addition, observations are presented that help describe the energy transfer mechanisms that cause explosive initiation within EBW detonators.

William Neal
Atomic Weapons Establishment

Date submitted: 28 Feb 2019 Electronic form version 1.4