

Abstract Submitted  
for the SHOCK19 Meeting of  
The American Physical Society

**A Morphologically Aware Model for TATB Based Explosives<sup>1</sup>**

JAMES GAMBINO, ALBERT NICHOLS, Lawrence Livermore Natl Lab — Predicting the performance and safety of explosive devices relies upon an understanding of the underlying hot spot mechanisms. It has long been known that explosive compositions which only differ in microstructure can have significant variations in ignitability and corner turning. Conventional reactive flow models do not incorporate microstructure information and, typically, different parameter sets are developed to account for lot-to-lot variations. We develop a morphologically aware detonation model for TATB based explosives that incorporates pore size distribution data. Pore size data is used to define the number of hot spots that are ignited as a function of the effective plastic strain. The ignition sites then spread throughout a 2D patch defined by a TATB cleavage plane. As the 2D patch burns convectively, the remainder of the explosive is consumed by a laminar burn. Initial burn products react through a pseudo-diffusion-controlled reaction to form the final products. The model parameters controlling the initiation and burning are optimized using Pop-Plot and particle velocity data from nominal experiments. To complete the model, the parameters that govern corner turning behavior are calibrated using data from axisymmetric corner turning experiments. LLNL-ABS-768480

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

James Gambino  
Lawrence Livermore Natl Lab

Date submitted: 28 Feb 2019

Electronic form version 1.4