Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Modeling the Fragmentation of a Brittle Zinc Compact CAMERON STEWART, THOMAS MCGRATH, JAMES WARNER, Indian Head Naval Surface Warfare Center — The fragmentation behavior of a cold-isostatically pressed zinc powder is numerically simulated using a couple Eulerian/Lagrangian framework. The material of interest is a compacted zinc powder that is ductile in compression but brittle in tension. The fragmentation behavior has been studied experimentally by Tang and Hooper. The computational model mimics the experimental scenario in which a 10 mm (L/D=1) right cylinder of the zinc compact is fired at a thin aluminum plate to induce fragmentation. The experimental investigation caught the fragments in artificial snow and reported the resulting particle size distribution. The zinc cylinder and plate are modeled as finite elements while the snow is represented in the Eulerian field. Initial fragment velocities up to 800 m/s were considered. A Grady-Kipp type method is applied to determine the particle sizes in major failure zones and an automated fragment counting mechanism is applied to quantify the particles that remain discretized on the computational mesh. The results are compared to experimental findings and used to suggest future work to improve fragmentation simulation.

Cameron Stewart
Indian Head Naval Surface Warfare Center

Date submitted: 22 Feb 2019 Electronic form version 1.4