Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Modeling and Simulation of the Impact Response of Maraging Steel Linear Cellular Alloys for Structural Energetic Material Applications[1] ADAM JAKUS, ANTHONY FREDENBURG, TAMMY MCCOY, JOE COCHRAN, NARESH THADHANI, Georgia Institute of Technology — A refined Johnson-Cook material strength model is developed for predicting the dynamic strain and fracture response of Maraging 250 steel at high-strain rates. Finite element simulations of rod-on-anvil impacts are carried out at velocities exceeding 100m/s and compared with experimental impact tests performed on a 7.62mm gas gun. The transient and final dimensions of the simulated and experimentally impacted rods are compared and Johnson-Cook strength parameters are modified accordingly. The newly developed Maraging 250 steel Johnson-cook strength model is then applied to simulate the impact response of multiple, 25% dense linear cellular alloys (LCA) of various geometries at velocities exceeding 100m/s. Analyses of the deformation, fragmentation, and stress transfer behavior of the simulated LCAs are performed and validated through comparison of corresponding impact experiments performed on the LCAs produced via an extrusion and reduction process. Stress transfer to the interior walls varies as a function of LCA geometry, which also influences the outward fragmentation and energy retention at the cross-section of impact.

[1]Research funded by DTRA grant no. HDTRA1-07-1-0018.

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Date submitted: 11 Feb 2009 Electronic form version 1.4