Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Material characteristics for an analytic hypervelocity impact performance model JOSHUA MILLER, University of Texas at El Paso, 500 W. University Ave., El Paso, TX 79968, SHANNON RYAN, Defence Science and Technology Organisation, 506 Lorimer Street, Fishermans Bend, VIC 3207, Australia — A performance model has recently been developed to describe the evolution of a hypervelocity impact of a threat with a dual-wall, Whipple shield. The Whipple shield uses an initial sacrificial wall to initiate threat fragmentation and melt before the debris expands over a void and is subsequently arrested by the second wall in front of a critical component. As such, understanding the initial interaction of the threat particle and the sacrificial wall is crucial to modeling the overall shield performance. Among the key material parameters that must be defined for the threat particle and sacrificial wall are the equilibrium shock wave states and tensile response to vacuum exposure. This paper documents the work performed to obtain the necessary material characteristics and a description of the fragmentation of the threat needed for the performance model. The results from the use of these quantities within the model are compared here with hydrodynamic simulations and available experimental records that have sought to characterize these parameters.

Joshua Miller
University of Texas at El Paso

Date submitted: 23 Jan 2015 Electronic form version 1.4