Abstract Submitted for the DFD15 Meeting of The American Physical Society

Experimental drag histories of shocked spherical particles KATHERINE PRESTRIDGE, GREG ORLICZ, ADAM MARTINEZ, Los Alamos National Laboratory — The horizontal shock tube (HST) facility at Los Alamos is used to investigate the drag forces on micrometer-sized particles dispersed in air when they are accelerated by a shock. Eight-frame, high-speed particle tracking velocimetry/accelerometry (PTVA) diagnostics are implemented to measure the trajectory of individual particles with high spatial and temporal resolution, and a shadowgraphy system is used to measure the shock position on each image. We present experiments over a range of Reynolds numbers, Mach numbers, particle sizes, and particle densities that explore the drag forces on solid, spherical, non-deforming particles. Experimental drag coefficients are calculated from eight dynamic measurements of particle position versus time, for Mach 1.3 and Mach 1.2 experiments. Experimental results show drag coefficients significantly larger than those predicted by the standard drag model for solid, spherical particles. These results are consistent with measurements made by Rudinger (1970) and Sommerfeld (1985). We will present experimental results and analysis of unsteady drag as a function of particle Reynolds number, Mach number and Stokes number.

> Katherine Prestridge Los Alamos National Laboratory

Date submitted: 21 Jul 2015

Electronic form version 1.4