

Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Compressible Particle Drag Experiments at Los Alamos National Laboratory KYLE HUGHES, ADAM MARTINEZ, ANKUR BORDOLOI, KATHERINE PRESTRIDGE, Los Alamos National Laboratory — Two series of small-scale experiments have been conducted at Los Alamos National Laboratory examining the compressible drag of particles. First, shock tube experiments individually track $4\ \mu\text{m}$ nylon particles subjected to mild shocks (Mach 1.1-1.3) using an 8-frame Particle Tracking Velocimetry diagnostic. Results of the particle tracking corroborate model predictions of the C_D during the passage of the shock across the particle at the acoustic time scale, τ_s . However, the unsteady drag coefficient increases by up to an order of magnitude at later times ($500\ \tau_s$). The second series of experiments examined the explosive dispersal of $100\ \mu\text{m}$ steel particles initially closely-packed in a $13 \times 6\ \text{mm}$ bed with proton radiography. Five explosive tests were performed with each test extracting 21 radiographs at $2\ \mu\text{s}$ temporal resolution. A vacuum shot was compared to three ambient carrier fluids: air, xenon, and SF_6 . Centerline upstream and downstream particle fronts extracted from the transmission radiographs demonstrate close agreement, suggesting the shock traversing the bed of particles provides little additional impulse to the dispersed particles in this regime.

Kyle Hughes
Los Alamos National Laboratory

Date submitted: 26 Feb 2019

Electronic form version 1.4