Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Predictive simulation of granular flows applied to compressible multiphase flow modeling RYAN J. GOETSCH, JONATHAN D. REGELE, Iowa State University — Multiphase flows have been an active area of research for decades due to their complex nature and occurrence in many engineering applications. However, little information exists about the dense compressible flow regime. Recent experimental work [Wagner *et al.*, Exp. Fluids **52**, 1507 (2012)] using a multiphase shock tube has studied gas-solid flows with high solid volume fractions ($\alpha = 0.2$) by measuring shock wave-particle cloud interactions. It is still unclear what occurs at the particle scale inside and behind the particle cloud during this interaction. The objective of this work is to perform direct numerical simulations to understand this phenomena. With this goal in mind, a discrete element method (DEM) solver was developed to predict the properties of a particle cloud formed by gravity driven granular flow through a slit opening. For validation purposes, the results are compared with experimental channel flow data. It is found that the mean velocity profile and mass flow rates correlate well with the experiment, however the fluctuation velocities are significantly under-predicted for both smooth and rough wall cases.

Ryan Goetsch
Iowa State University

Date submitted: 30 Jul 2014 Electronic form version 1.4