Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Euler-Lagrange Simulations of Shock Wave-Particle Cloud Interaction[1] RAHUL KONERU, University of Florida, BERTRAND ROLLIN, Embry-Riddle Aeronautical University, FREDERICK OUELLET, CHANYOUNG PARK, S. BALACHANDAR, University of Florida — Numerical experiments of shock interacting with an evolving and fixed cloud of particles are performed. In these simulations we use Eulerian-Lagrangian approach along with state-of-the-art point-particle force and heat transfer models. As validation, we use Sandia Multiphase Shock Tube experiments and particle-resolved simulations. The particle curtain upon interaction with the shock wave is expected to experience Kelvin-Helmholtz (KH) and Richtmyer-Meshkov (RM) instabilities. In the simulations evolving the particle cloud, the initial volume fraction profile matches with that of Sandia Multiphase Shock Tube experiments, and the shock Mach number is limited to M=1.66. Measurements of particle dispersion are made at different initial volume fractions. A detailed analysis of the influence of initial conditions on the evolution of the particle cloudis presented. The early time behavior of the models is studied in the fixed bed simulations at varying volume fractions and shock Mach numbers.The mean gas quantities are measured in the context of 1-way and 2-way coupled simulations.

[1]This work was supported by the U.S. Department of Energy, National Nuclear Security Administration, Advanced Simulation and Computing Program, as a Cooperative Agreement under the Predictive Science Academic Alliance Program, Contract No. DE-NA0002378.

Rahul Babu Koneru
University of Florida

Date submitted: 01 Aug 2017 Electronic form version 1.4