Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Density Discontinuity Interaction with a Structured Array of Particles BRANDON E. OSBORNE, University of Florida, T.L. JACKSON, University of Florids, S. BALACHANDAR, University of Florida — Discontinuities in density and temperature, or contact discontinuities, arise in a multitude of situations. Explosive detonation and volcanic eruption may both contain contact discontinuities. A shock and contact form when the diaphragm of a shock tube ruptures. Shock interaction with particles has been studied extensively; however, little is known about the effects a contact has on particle force history and the flow field. To better understand the phenomena occurring in this interaction, a series of inviscid, fully-resolved direct numerical simulations were performed. The simulations consisted of a bed of particles arranged in a simple cubic array and a shock and contact initialized near the first particle. Two initial conditions were used, close and intermediate, to highlight combined and more isolated effects of the shock and contact. Close denotes the shock and contact have a small initial separation, such as when a particle bed is close to the diaphragm of a shock tube when it ruptures. Intermediate denotes there is a larger initial separation between the shock and contact, such as when a particle bed is far from the diaphragm. The focus of this talk is to present the simulation results and highlight various phenomena at play during contact-particle interaction.

Brandon Osborne
University of Florida

Date submitted: 01 Aug 2017 Electronic form version 1.4