Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

**On a Gas-Particle Analogue to the Richtmyer-Meshkov Instability. Part 2: The Initially Entrapped Gas**[1] BERTRAND ROLLIN, Embry-Riddle Aeronautical University, Daytona Beach, FREDERICK OUELLET, Los Alamos National Laboratory, BRADFORD DURANT, RAHUL KONERU, S. BALACHANDAR, University of Florida — We study a planar numerical shock tube containing a corrugated particle curtain. The curtain is about 4mm thick and has a peak volume fraction of about 26%. It is composed of spherical particles of 115$\mu$m in diameter with a density of 2500kg.m$-3$, thus mimicking glass particles commonly used in multiphase shock tube experiments or multiphase explosive experiments. Under these conditions the gas-particle flow that follows the shock interaction with the curtain is two-way coupled. Using a Eulerian-Lagrangian approach, we track trajectories of computational particles in the three-dimensional planar shock tube as well as the air initially trapped inside the particle curtain. This work focuses on the latter. We characterize the evolution of the gas cloud inside the particle curtain for two Mach numbers, M=1.21 and M=1.50, and two dominant wavelengths, l=3.6mm and l=7.2mm, as it is advected downstream and undergoes Richtmyer-Meshvov instability with features corresponding to the initial perturbation imposed on the particle curtain. We also analyze the behavior of the gas after re-shock.

[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.

Bertrand Rollin
Embry-Riddle Aeronautical University, Daytona Beach

Date submitted: 02 Aug 2020 Electronic form version 1.4