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Validation of a Simplified WENO Scheme with Artificial Viscosity for a Shock Interface Interactions[1] BRIAN ROMERO, SVETLANA POROSEVA, PETER VOROBIEFF, University of New Mexico — The goal of this work is to validate numerical simulation of the shock-driven evolution of an initially axisymmetric cylindrical particle cloud (or a heavy gas column) against laboratory experiments. In the initial conditions in the experiment, there is a density gradient in gas, an average density gradient due to the particle seeding, or both. The cylindrical column is comprised of a mixture of sulfur hexafluoride, acetone, and air, and surrounded by air, leading to the representative Atwood number of 0.61. The Mach number in experiments varied from 1.2 to 2.0. Simulations were conducted at Mach numbers matching the experiment using a simplified WENO scheme incorporating a new C-method for artificial viscosity. The initial modeling/validation exercises featured a two-dimensional simulation of shock interaction with the gas column, with variations in the level of initial diffusion on the density interface from a sharp interface to a diffuse boundary matching the conditions measured in experiment. Further studies include 3D problems with multiple gas species and immersed boundary conditions, and shock wave refraction for various values of the gas constant γ. The limit case for comparisons is shock interaction with a solid cylinder.

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