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Dispersal of Rock and Coal Particles Produced by a Moving Shock Wave[1] SHUYUE LAI, Univ of Maryland-College Park, RYAN HOUIM, University of Florida, ELAINE ORAN, Univ of Maryland-College Park — Numerical simulations of a shock wave passing over a thin layer of dust particles were performed using an unsteady multidimensional compressible model. The model takes into account multiple types of particle by using a binning approach. Particles in each bin have their own uniform particle type and diameter. The model solves one set of Euler equations for the gas phase and N sets of Euler equations for N particle phases. Sets of the governing equations are coupled with each other through the effects of drag, lift, etc. Specifically, we performed simulations of dispersal of coal- and rock-dust particles under the action of a Mach 1.4 shock wave in which the coal- and rock-dust particles are uniformly mixed. The rock and coal particles have a density of 2500 kg/m^3 and 1300 kg/m^3, and a diameter of 80 μm and 10 μm, respectively. The results show that the particle dispersal depends on both the size and density. Particles with small moment of inertia tend to follow the gas flow, while particles with larger moment of inertia experience a larger vertical lifting force. In addition, we performed the simulations where a thin layer of rock-dust was placed on top of a thicker layer of coal-dust and studied the effect of the rock dust on suppressing the coal-dust lifting.

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Shuyue Lai
Univ of Maryland-College Park

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