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The role of granular shocks in dust-layer dispersal by shock waves
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Exactly how dust-layers are lifted and dispersed by shocks has been a longstanding question in compressible multiphase flow. Understanding the mechanism for this, however, is extremely important for early control of dust explosions. We address this problem by numerically solving a set of equations that couples a fully compressible representation of a gas with a kinetic-theory model for a granular medium (see Journal of Fluid Mechanics, (2016) 789:166-220) to simulate a shock propagating along the surface of a dust layer. The results show that the majority of the dispersed dust is lifted by hydrodynamic shear directly behind the shock wave. Simultaneously, large forces are produced behind the shock that compact the dust layer and create a granular shock. The effects from this granular shock on the surface of the dust layer destabilize the gas-dust boundary layer, which, in turn, enhances turbulence and the rate of dust dispersal.

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