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Multiphase Instabilities in Explosive Dispersal of Particles[1]
BERTRAND ROLLIN, FREDERICK OUELLET, SUBRAMANIAN ANNAMALAI, S. "BALA" BALACHANDAR, Center for Compressible Multiphase Turbulence - Univ. of Florida — Explosive dispersal of particles is a complex multiphase phenomenon that can be observed in volcanic eruptions or in engineering applications such as multiphase explosives. As the layer of particles moves outward at high speed, it undergoes complex interactions with the blast-wave structure following the reaction of the energetic material. Particularly in this work, we are interested in the multiphase flow instabilities related to Richmyer-Meshkov (RM) and Rayleigh-Taylor (RM) instabilities (in the gas phase and particulate phase), which take place as the particle layer disperses. These types of instabilities are known to depend on initial conditions for a relatively long time of their evolution. Using a Eulerian-Lagrangian approach, we study the growth of these instabilities and their dependence on initial conditions related to the particulate phase – namely, (i) particle size, (ii) initial distribution, and (iii) mass ratio (particles to explosive). Additional complexities associated with compaction of the layer of particles are avoided here by limiting the simulations to modest initial volume fraction of particles. A detailed analysis of the initial conditions and its effects on multiphase RM/RT-like instabilities in the context of an explosive dispersal of particles is presented.

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