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A Study of Interfacial-Instability-Induced Mixing in Explosive Dispersal of Particles[1] BERTRAND ROLLIN, CCMT - Univ of Florida - Gainesville, SUBRAMANIAN ANNAMALAI, FREDERICK OUELLET, Univ of Florida - Gainesville — Recent experiments have shown that when a bed of particles is explosively dispersed, a multiphase instability front may occur, and lead to the formation of aerodynamically stable jet-particle structures. It is believed that these coherent structures originates from the early phase of explosive dispersal, in particular, in the manner in which the initial layer of particles undergoes instability, as it rapidly expands in the radial direction. In this work we want to isolate and study the effect of gas-particle two-way interaction on the nature of Rayleigh-Taylor (RT) and Richtmyer-Meshkov (RM) instabilities of an explosively driven particle layer. As a result we perform numerical experiments, where we limit the initial volume fraction of the particle layer. The focus of this investigation is on the RT and RM growth mechanisms in the linear and non-linear stages under the complexity of the cylindrical geometry, very high pressures and densities associated with the detonation process. Thus, in addition to the initial disturbance created by the random distribution of particles, we explicitly vary the initial density of the particle and gas distribution. Detailed analyses of single mode and two-mode RT/RM-induced mixing are presented.

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