

Abstract Submitted
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Shock Driven Multiphase Instabilities in Scramjet Applications

JACOB MCFARLAND, The University of Missouri — Shock driven multiphase instabilities (SDMI) arise in many applications from dust production in supernovae to ejecta distribution in explosions. At the limit of small, fast reacting particles the instability evolves similar to the Richtmyer-Meshkov (RM) instability. However, as additional particle effects such as lag, phase change, and collisions become significant the required parameter space becomes much larger and the instability deviates significantly from the RM instability. In scramjet engines the SDMI arises during a cold start where liquid fuel droplets are injected and processed by shock and expansion waves. In this case the particle evaporation and mixing is important to starting and sustaining combustion, but the particles are large and slow to react, creating significant multiphase effects. This talk will examine multiphase mixing in scramjet relevant conditions in 3D multiphase hydrodynamic simulations using the FLASH code from the University of Chicago FLASH center.

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