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Hydrodynamic Instabilities in Blast-Driven Systems MARC HENRY DE FRAHAN, ERIC JOHNSEN, Univ of Michigan - Ann Arbor — Mixing from hydrodynamics instabilities such as Richtmyer-Meshkov, Rayleigh-Taylor, and Kelvin-Helmholtz, occurs in a wide range of engineering applications such as inertial confinement fusion, supernova collapse, and scramjet combustion. The success of these applications depends on an accurate understanding of these phenomena. Following previous work investigating hydrodynamic mixing from the interaction of a perturbed interface with a planar blast wave, we model the perturbation growth by analyzing the different acceleration phases of a blast wave: an instantaneous acceleration (a pressure increase) followed by a gradual, time-dependent deceleration (a pressure decrease). Depending on the characteristics of these phases, the instability will be dominated by Richtmyer-Meshkov or Rayleigh-Taylor growth. We use a high-order accurate Discontinuous Galerkin method that prevents pressure errors at interfaces with variable specific heats ratios to simulate these systems and understand the different growth regimes.

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