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Growth of interfacial perturbations driven by blast waves[1] MARC HENRY DE FRAHAN, ERIC JOHNSEN, DOV SHVARTS, R. PAUL DRAKE, University of Michigan — Hydrodynamic instabilities play important roles in a variety of high-energy-density physics flows, including problems in astrophysics and inertial confinement fusion. While classical Richtmyer-Meshkov (RM) and Rayleigh-Taylor (RT) unstable interfacial flows are relatively well understood, less is known about interactions of blast waves with interfaces. Using a new 2D high-order Discontinuous Galerkin multifluid hydro code, we simulate the interaction of a blast, modeled as a shock followed by a finite-length rarefaction, with a single-mode, perturbed interface separating heavy and light fluids. This model allows us to control, independently, the shock strength, rarefaction strength and length. Starting the blast in the heavy material gives rise to an RT-unstable configuration (driven by the rarefaction). Our findings indicate that the time-evolution of the perturbation growth can be described as a succession of three phases corresponding to different mechanisms (linear RM, combined decompression and RT with time-varying Atwood number and acceleration, and circulation-driven), which we will explain in detail and relate to the blast properties.

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