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Vortex-sheet modeling of hydrodynamic instabilities produced by oblique shocks interacting with perturbed interfaces in the HED regime[1] SAM PELLONE, Univ of Michigan - Ann Arbor, CARLOS DI STEFANO, ALEXANDER RASMUS, Los Alamos National Laboratory, CAROLYN KURANZ, ERIC JOHNSEN, Univ of Michigan - Ann Arbor — The growth of perturbations due to hydrodynamic instabilities at material interfaces, such as Richtmyer-Meshkov (RM), Rayleigh-Taylor (RT), and Kelvin-Helmholtz (KH), plays an important role in the evolution of high-energy-density systems (HED). Previous HED experiments have shown that the perturbation growth of coupled RM, RT, and KH can be measured by considering a perturbed interface tilted with respect to an incident shock wave. As the shock interacts with the interface, a sheet of vorticity is produced along the interface due to the baroclinic torque generated by the misalignment of the density gradient (across the interface) and pressure gradient (across the shock). In this study, we investigate the post-shock hydrodynamics using a vortex-sheet model. This approach enables us to relate the interfacial dynamics to the vorticity distribution. In particular, we examine the competition between shock- vs. shear-driven perturbation growth by considering different tilt angles and develop a scaling for the early time behavior. Additionally, the vortex-sheet can be used to predict time-dependent RT growth and interface decompression arising from laser turn-off.

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