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Evolution of multimode perturbations in spherical implosions[1]
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— In this project, the growth of perturbations on the inner interface of a dense imploding shell is studied by means of high resolution three-dimensional numerical simulations using the AMR codes PLUTO and FLASH. We consider broadband and narrowband initial perturbations with mode numbers up to $\ell = 200$. Perturbation growth happens as a consequence of Richtmyer-Meshkov instability seeded by the incident shock and subsequent reshocks, as well as Rayleigh-Taylor instability as the interface is decelerated near stagnation. We report on the evolution of the mix layer width, the atomic mix and the turbulent kinetic energy. For the case of broadband initial perturbations, a small-amplitude analysis that is valid beyond reshock is applied to predict the evolution of the mix layer width and to quantify the impact of RT/RM instabilities and convergence and compression effects on the mix layer growth. Finally, it is shown that the mix layer growth is well represented by a just-saturated mode model.

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