

Abstract Submitted
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Supernova and Hydrodynamic Instabilities SRABASTI DUTTA,
State University of New York at Stony Brook — We have developed a curved geometry front tracking algorithm for interface instabilities. The code has been verified by comparing simulations to analytical solutions and various experiments. Using this algorithm, we have proved that front tracking is an accurate and efficient algorithm in the sense that tracking an interface can reduce the error significantly. We have also conducted numerical simulations of Richtmyer-Meshkov instabilities in spherical geometry, and have demonstrated scaling invariant with respect to shock Mach number for fluid mixing statistics. Our results are validated by the convergence under both mesh refinement and statistical ensemble average. We also show that the spherical geometry converge to planar geometry when the number of modes of interface perturbation goes to infinity. We also present a tracked sharp flame numerical model for thermonuclear explosion of Chandrasekhar mass white dwarfs, also is called Type Ia supernova. Simulations for turbulent combustion in Type Ia supernova have been carried out by using this model.

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