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Asymptotic behavior of the mixed mass in Rayleigh-Taylor and Richtmyer-Meshkov instability induced flows[1] YE ZHOU, WILLIAM CABOT, LLNL, BEN THORNBER, The University of Sydney — Rayleigh-Taylor instability (RTI) and Richtmyer-Meshkov instability (RMI) are serious practical issues in inertial confinement fusion (ICF) research and also have relevance to many cases of astrophysical fluid dynamics. So far much of the attention has been paid to the late-time scaling of the mixed width, which is used as a surrogate to how well the fluids have been mixed. Yet, the actual amount of mixed mass could be viewed as a more direct indicator on the evolution of the mixing layers due to hydrodynamic instabilities. Despite its importance, there is no systematic study as yet on the scaling of the mixed mass for either the RTI or the RMI induced flow. In this work, the normalized mixed mass (Ψ) is introduced for measuring the efficiency of the mixed mass. Six large numerical simulation databases have been employed: the RTI cases with heavy-to-light fluid density ratios of 1.5, 3, and 9; the single shock RMI cases with density ratios of 3 and 20; and a reshock RMI case with density ratio of 3. Using simulated flow fields, the normalized mixed mass Ψ is shown to be more sensitive in discriminating the variation with Atwood number for the RTI flows. Moreover, Ψ is demonstrated to provide more consistent results for both the RTI and RMI flows when compared with the traditional mixedness parameters, Ξ and Θ.

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