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Compressibility and Stratification Effects on Single-Mode Rayleigh-Taylor Instability SCOTT RECKINGER, University of Colorado Boulder, DANIEL LIVESCU, Los Alamos National Laboratory, OLEG VASILYEV, University of Colorado Boulder — Simulations of single-mode compressible Rayleigh-Taylor instability (RTI) are performed using the Adaptive Wavelet Collocation Method (AWCM). Due to the physics-based adaptivity and direct error control of the method, AWCM is ideal for resolving the wide range of scales present in RTI growth. AWCM is used in conjunction with non-reflecting boundary conditions developed for highly stratified systems. This combination allows for extremely long domains, which is necessary for observing the late time growth of compressible RTI. The background state consists of two diffusively mixed stratified fluids of differing molar masses. Of interest are the compressibility effects on the departure time from the linear growth, the onset of strong non-linear interactions, and the late-time behavior of the fluid structures. For initial conditions corresponding to thermal equilibrium, the background stratification suppresses the instability growth when the molar masses are similar. A reversal in this monotonic behavior is observed for large molar mass differences, when stratification acts to enhance the bubble growth. The effects of the background stratification on the late-time vorticity generation and the associated induced velocities are also investigated.

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