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A detailed numerical investigation of the single-mode Richtmyer-Meshkov instability AMOL DHOTRE, PRAVEEN RAMAPRABHU, University of North Carolina at Charlotte, GUY DIMONTE, Los Alamos National Laboratory, RMI COLLABORATION — The single-mode shock-driven Richtmyer-Meshkov (RM) instability is investigated using high resolution numerical simulations.[1] The growth rate of an initially sinusoidal perturbation is evaluated against linear theory and an impulsive model over a wide range of influential parameters: [A, Ma, 2D/3D, γ_1/γ_2, ka_0]. The results are in good agreement with linear theory for small amplitudes, and with the impulsive model when compressibility effects may be ignored. For large density differences, spikes exhibit acceleration above the velocity predicted by linear theory, while bubbles decay from the start. The spike acceleration disappears with larger initial amplitudes consistent with simple potential-flow models.[2] Our results present a consistent but complicated picture of the early-stage growth of both small and large amplitude RM, and clarify the regimes of validity in parameter space of several existing linear and nonlinear theories.

[1]Numerical study of the single-mode Richtmyer-Meshkov instability for a comprehensive set of conditions, A. Dhotre, P. Ramaprabhu & Guy Dimonte, To be submitted to Physics of Fluids.
[2]Modeling of the single-mode Richtmyer-Meshkov instability for a comprehensive set of conditions, Guy Dimonte, P. Ramaprabhu & A. Velikovich, To be submitted to Physics of Fluids.

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