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Nonlinear evolution of Richtmyer-Meshkov and Rayleigh-Taylor instabilities in a domain of a finite size[1] A. QAMAR, S.I. ABARZHI, University of Chicago, Chicago, IL, USA — We developed theoretical analysis to systematically study the nonlinear evolution of Richtmyer-Meshkov and Rayleigh-Taylor instability in a domain of a finite size. Fluids have either similar or contrasting densities, and acceleration is either impulsive or sustained. The flow is three-dimensional and periodic in the plane normal to the direction of acceleration, and has no external sources. Group theory analysis is applied to accurately account for the mode coupling. Asymptotic nonlinear solutions are found to describe the interface dynamics. The effect of the size of the domain on the diagnostic parameters of the flow is identified. In particular, it is shown that in a finite size the domain the flow is decelerated in comparison to the spatially extended case. The outcomes of the theoretical analysis results for the numerical modeling of the Richtmyer-Meshkov and Rayleigh-Taylor instabilities and for the design of experiments on high energy density plasmas are discussed.

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