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Linear and Nonlinear Simulations of the Richtmyer- Meshkov Instability in Magnetohydrodynamics[1] RAVI SAMTANEY, ABEER BAKSH, SONG GAO, King Abdullah University of Science and Technology, VINCENT WHEATLEY, University of Queensland — Nonlinear ideal magnetohydrodynamics (MHD) simulations and analysis indicate that the Richtmyer-Meshkov instability (RMI) is suppressed in the presence of a magnetic field in Cartesian slab geometry. We present results of linear and nonlinear MHD simulations of RMI in cylindrical geometry. The linear simulations are performed with a numerical method that is an extension of the method proposed by Samtaney (J. Comput. Phys. 2009). In the absence of a magnetic field, linear analysis indicates that RMI growth rate during the early time period is similar to that observed in Cartesian geometry. However, this RMI phase is short-lived and followed by a Rayleigh-Taylor growth phase with an accompanied exponential increase in the perturbation amplitude. We examine several strengths of the magnetic field (characterized by $\beta = 2p/B^2$). For the strongest field case studied ($\beta \approx 2$) we see a significant suppression of the instability. We will present a description of the numerical methods, a complete characterization of the RMI linear stability in cylindrical geometry, and comparisons between linear and nonlinear MHD simulations for field strengths, and azimuthal and axial wavenumbers.

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