Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Linear Simulations of the MHD Richtmyer-Meshkov Instability in Cylindrical Geometry ABEER BAKSH, RAVI SAMTANEY, KAUST, VINCENT WHEATLEY, University of Queensland — Numerical simulations and analysis indicate that the Richtmyer-Meshkov instability (RMI) is suppressed in ideal magnetohydrodynamics (MHD) in Cartesian slab geometry. Motivated by the presence of hydrodynamic intstabilities in inertial confinement fusion and suppression by means of a magnetic field, we investigate the RMI via linear MHD simulations in cylindrical geometry. The physical setup is that of a Chisnell-type converging shock interacting with a density interface with either axial or azimuthal (2D) or a combination of both (3D) perturbations. The linear stability is examined in the context of an initial value problem (with a time-varying base state) wherein the linearized ideal MHD equations are solved by an extension of the numerical method proposed by Samtaney (J. Comput. Phys. 2009). Linear simulations in the absence of a magnetic field, indicate that RMI growth rate during the early time period 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 $\beta = \frac{2p}{B^2}$) and observe a significant suppression of the instability for $\beta \approx 2$.

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Date submitted: 01 Aug 2014 Electronic form version 1.4