Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Velocity shear stabilization of Rayleigh-Taylor instabilities[1]
CHING PUI HUNG, ADIL HASSAM, IREAP, University of Maryland — Rayleigh-Taylor modes in magnetized fluids can be stabilized by flow shear. A detailed numerical study of this effect is revisited in linear and nonlinear regimes, with various cross-field velocity profiles. A 2D dissipative MHD code is employed to simulate the instabilities. It is found that for fixed flow shear V', the linear growth rates increase with the wave-number kL transverse to the density gradient and the B-field, but become small for large kL. In addition, the unstable regime in k-space shrinks for higher V', which is consistent with the fact that higher k modes would be more susceptible to flow shear and the well recognized result of significant stabilization at $V'^2 > gn'/n$. In the nonlinearly saturated regime, the density fluctuation and the degree of flattening of the initial inverted density profile are found to decrease as V' increases; unstable modes are almost completely stabilized when V' is a few times the RT growth rate. The mode cascades to longer wavelengths and other results will be compared with observations of magnetic fluctuations from the Maryland Centrifugal Experiment, MCX. Finally, Kelvin-Helmholtz instabilities are also observed in the simulation; the stability criterion for the onset of the KH, similar to the Rayleigh inflexion theorem, will also be examined.

[1]Work supported by USDOE.

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Date submitted: 13 Jul 2011

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