Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Effects of Line-tying on Resistive Tearing Instability in Slab Geometry YI-MIN HUANG, University of Wisconsin, Madison/ University of New Hampshire, ELLEN G. ZWEIBEL, University of Wisconsin, Madison — The effects of line-tying on magnetohydrodynamic instabilities are an important issue for astrophysical plasmas, such as the solar corona or astrophysical jets. Recently, several laboratory experiments aimed at studying line-tying effects have been initiated. This work studies the effect of line-tying on the resistive tearing instability in the slab geometry. A strong guide field perpendicular to the conducting boundary is assumed, therefore the system is described by the well-known reduced magnetohydrodynamic (RMHD) equations. The linearized eigenvalue problem is solved numerically. It is found that line-tying has a stabilizing effect. The tearing mode is stabilized when the system length L is shorter than a critical length L_c, which is independent of the resistivity η. When L is not too much longer than L_c, the growthrate γ is proportional to η . When L is sufficiently long, the tearing mode scaling $\gamma \sim \eta^{3/5}$ is recovered. The transition from $\gamma \sim \eta$ to $\gamma \sim \eta^{3/5}$ occurs at a transition length $L_t \sim \eta^{-2/5}$.

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Date submitted: 14 Aug 2008 Electronic form version 1.4