Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

$m = 1$ **internal kink modes in a line-tied screw pinch** YI-MIN HUANG, ELLEN G. ZWEIBEL, CARL R. SOVINEC, University of Wisconsin, Madison — It is well known that the radial displacement of the m=1 internal kink mode in a periodic screw pinch has a steep jump at the resonance surface where $\mathbf{k} \cdot \mathbf{B} = \mathbf{0}$ (Rosenbluth, Dagazian, and Rutherford, Phys. Fluids, 1973). In a line-tied system, relevant to solar and astrophysical plasmas, the resonance surface is no longer a valid concept. It is then of interest to see how line-tying alters the aforementioned result of a periodic system. If the line-tied system also produces steep gradients, it may lead to strong heating, even with weak dissipation. Numerical solution of the eigenmode equations finds that the fastest growing mode in a line-tied system still possesses a jump in the radial displacement at the location coincident with the resonant surface of the fastest growing mode in the periodic counterpart. However, the inner layer is thicker in a line-tied system and the growth rate is smaller. As the system length approaches infinity, both the inner layer thickness and the growth rate approach the periodic ones. How the inner layer thickness and the growth rate scales with the system length will also be discussed.

Yi-Min Huang
University of Wisconsin, Madison

Date submitted: 21 Jul 2005 Electronic form version 1.4