Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Nonlinear Localized Interchange Mode and Current Sheet Formation[1] P. ZHU, C.R. SOVINEC, C.C. HEGNA, University of Wisconsin-Madison — The localized interchange mode is a fundamental instability in inhomogeneous plasmas with finite β and magnetic shear. Recent work based on a reduced MHD formulation indicates that, while the violation of the Suydam criterion itself may not impose a practical operational constraint, the nonlinear development of a robust localized interchange instability could lead to the formation of thin current sheets, which are the prelude to reconnection processes in the system [Gupta, Callen, and Hegna, 2004]. The spontaneous formation of thin current sheets from interchange-like processes, such as the magnetic Rayleigh-Taylor instability, has also been found in simulations of solar coronal mass ejection [Isobe *et al.*, 2005]. In this work, we explore the relation between the nonlinear development of the localized interchange mode and the formation of thin current sheet with direct ideal and extended MHD simulations using the NIMROD code. Initial NIMROD simulation results confirm the general sequence of the linear growth phase and nonlinear saturating phase for the evolution of the localized interchange mode found earlier by Gupta, Callen, and Hegna (2004). The formation of the Rayleigh-Taylor finger-mushroom pattern is also evident in NIMROD simulations of the nonlinear localized interchange mode. Investigation of current sheet formation and comparison with the earlier reduced MHD simulation will be presented.

[1]Research supported by U.S. DOE grant No. DE-FG02-86ER53218.

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Date submitted: 19 Jul 2006 Electronic form version 1.4