Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Nonlinear development of Magnetic Islands by Symmetry Breaking in Fast Interchange-Drift Modes O. AGULLO, M. MURAGLIA, S. BENKADDA, University d'Aix-Marseille, France, M. YAGI, Kyushu University, Japan, W. HORTON, University of Texas at Austin, X. GARBET, CEA, France, A. SEN, Institute for Plasma Research, India — We investigate the multi-scale nonlinear dynamics of a linearly stable/unstable tearing mode with small-scale interchange turbulence using 2D MHD numerical simulations. For a stable tearing mode, the nonlinear beating of the fastest growing small scale interchange modes drives a magnetic island with an enhanced growth rate to a saturated size that is proportional to the turbulence generated anomalous diffusion. For a linearly unstable tearing mode the island saturation size scales inversely as one-fourth power of the linear tearing growth rate in accordance with weak turbulence theory predictions. Turbulence is also seen to introduce significant modifications in the flow patterns surrounding the magnetic island. Examples from ITG and ETG driven turbulence are given.

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Date submitted: 06 Sep 2011 Electronic form version 1.4