Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Modeling Flow Suppression of Error-field-induced Magnetic Islands in Tokamaks J.A. BRESLAU, W. PARK, Princeton Plasma Physics Laboratory — Small deviations from axisymmetry in applied tokamak magnetic fields can induce island formation at magnetic surfaces whose rotational transform resonates with the perturbation. These islands have a braking effect on plasma rotation that can destabilize resistive wall modes. The IPEC code[1] is useful for computing plasma response to harmonic perturbations in the infinite-conducting limit, assuming perfect shielding at the resonant surface, but cannot predict the nonlinear effects of finite-sized islands. Using the nonlinear extended MHD code M3D,[2] we explore the effects of a 2,1 perturbation on the nonlinear evolution of a family of equilibria with finite resistivity. Particular attention is paid to the effects of toroidal flow on suppressing island formation, making contact with the analytic theory of Fitzpatrick.[3] Island suppression is shown to depend strongly on the tearing mode stability properties of the equilibrium.

[1]J.K. Park, et al., *Phys. Plasmas* **14**, 052110 (2007).
[2]W. Park, *et al.*, *Phys. Plasmas* **6**, 1796 (1999).
[3]R. Fitzpatrick, *Phys. Plasmas* **5**, 3325 (1998).

J.A. Breslau
PPPL

Date submitted: 20 Jul 2009 Electronic form version 1.4