

**Abstract Submitted for the 51st Annual Meeting
Division of Plasma Physics
November 2–6, 2009, Atlanta, Georgia**

Non-Ideal ELM Stability and Non-Axisymmetric Field Penetration Calculations with M3D-C1,* N.M. Ferraro, M.S. Chu, P.B. Snyder, *GA*, S.C. Jardin, *PPPL*, X. Luo, *Rensselaer Polytechnic Inst.* — Numerical studies of ELM stability and non-axisymmetric field penetration in diverted DIII-D and NSTX equilibria are presented, with resistive and finite Larmor radius effects included. These results are obtained with the nonlinear two-fluid code M3D-C1, which has recently been extended to allow linear non-axisymmetric calculations. Benchmarks of M3D-C1 with ideal codes ELITE and GATO show good agreement for the linear stability of peeling-ballooning modes in the ideal limit. New calculations of the resistive stability of ideally-stable DIII-D equilibria are presented. M3D-C1 has also been used to calculate the linear response to non-axisymmetric external fields; these calculations are benchmarked with Surfmn and MARS-F. New numerical methods implemented in M3D-C1 are presented, including the treatment of boundary conditions with C^1 elements in a non-rectangular mesh.

*Work supported in part by the US DOE under DE-FG03-95ER54309 and DE-AC02-09CH11466.