Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Modeling Edge Plasma Response to 3D Fields in DIII-D[1] N.M. FERRARO, T.E. EVANS, L.L. LAO, A.D. TURNBULL, General Atomics, M.J. LANCTOT, Lawrence Livermore National Laboratory, M.W. SHAFER, E.A. UNTERBERG, Oak Ridge National Laboratory, R. NAZIKIAN, Princeton Plasma Physics Laboratory, R.A. MOYER, D.M. ORLOV, University of California San Diego — Modeling of plasma response to applied non-axisymmetric fields show significant displacement of edge temperature and density profiles. The calculated displacements, often of two centimeters or more in H-mode pedestals with parameters appropriate to DIII-D, are due to the helical distortions resulting from stable edge modes being driven to finite amplitude by the applied fields. At low toroidal mode numbers (particularly $n = 1$ and $n = 2$) these displacements are greater in magnitude, and typically different in phase, than the distortions of the separatrix manifolds predicted from vacuum modeling. Comparison of these results finds good agreement with experimental measurements from Thomson scattering, beam emission spectroscopy, and soft x-ray imaging. Implications for ITER and resonant magnetic perturbation edge localized mode suppression are discussed. The plasma response is calculated using the M3D-C1 code, which implements a resistive two-fluid model, and self-consistently includes the plasma, separatrix, and scrape-off layer.

[1]Work supported by the US Department of Energy under DE-FG03-95ER54309, DE-FG02-05ER54809, DE-AC52-07NA27344, DE-AC05-00OR22725, DE-AC02-09CH11466, and DE-FG02-07ER54917.

Nathaniel Ferraro
General Atomics

Date submitted: 12 Jul 2012 Electronic form version 1.4