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Category Number and Subject: 5.6.2 DIII-D Tokamak

[ ] Theory [X] Experiment

**I-Coil Perturbative Experiment to Investigate Effects of 3D Error Fields on Magnetic Surfaces,*** L.L. Lao, M.S. Chu, A.W. Hyatt, G.L. Jackson, R.J. La Haye, M.J. Schaffer, E.J. Strait, T.S. Taylor, A.D. Turnbull, *General Atomics*, D.P. Brennan, *ORISE* — An experiment to investigate the effects of 3D error fields on magnetic surfaces was carried out in DIII-D using the new internal coils (I-Coils). Slowly rotating n=1 traveling waves at 5 Hz and various amplitudes (~0.1-0.3% of the poloidal equilibrium field) were applied to perturb the edge magnetic surfaces by pre-programming the I-Coil currents. At 0.1% perturbation, the vertical separatrix location difference between magnetic reconstructions which assume toroidal symmetry and Thomson scattering measurements of $T_e$ responds in phase to the applied perturbed field with an oscillation amplitude ~2 cm. At 0.3% perturbation, the amplitude of the difference in separatrix location grows in time correlated with an early discharge termination due to appearance of a locked mode. The results are consistent with the conjecture that the observed separatrix location differences between magnetic and Thomson scattering measurements in some DIII-D discharges are due to the small toroidal asymmetry of the external shaping coil locations and that plasma response is importance. Details will be presented.

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