

**Abstract Submitted for the Forty-Eighth Annual Meeting
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Category Number and Subject: 5.6.2. DIII-D Tokamak

Theory Experiment

Non-Axisymmetric Equilibrium Measurements in DIII-D,*

E.J. Strait, R.J. La Haye, L.L. Lao, M.J. Schaffer, *General Atomics*, A.M. Garofalo, H. Reimerdes, *Columbia U.*, A.L. Montgomery, *Butler U.* – Stationary non-axisymmetric states may arise spontaneously in a tokamak plasma, or they may be driven by external magnetic perturbations (intrinsic or applied). Examples include distortion of the plasma shape by field errors, non-rotating magnetic islands, resonant response of wall-stabilized kink modes at high beta, and stochastic boundary layers generated by shorter-wavelength perturbations. Despite the small amplitudes of typical magnetic perturbations, the effects on plasma performance can be significant. DIII-D's new capability for balanced beam injection allows experiments at low plasma rotation where magnetic asymmetries can penetrate the plasma more easily; these conditions may also be relevant to ITER plasmas. We will discuss the impact of non-axisymmetric states on plasma performance in DIII-D, the experience with measurement of these states using the present magnetic diagnostic set, and the requirements for a full three-dimensional equilibrium reconstruction.

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