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Category Number and Subject: 6.15 MHD, 6.20 DIII-D Tokamak  
& 9.10 Diagnostics

Theory    Experiment

**Diagnosis of 3D Perturbed Equilibrium States of DIII-D,\***

B.J. Tobias, J.K. Park, *PPPL*; L. Yu, C.M. Muscatello, C.W. Domier, N.C. Luhmann, Jr., *U. California-Davis*; M.E. Austin, *U. Texas-Austin*; J.D. King, C. Paz-Soldan, *ORISE*; A.D. Turnbull, *General Atomics*— Non-axisymmetric 3D equilibria supported by saturated internal magnetic islands have been compared to those induced by external magnetic perturbation and solutions obtained by the IPEC method. Diagnosis of these modes as proxy for the least stable non-axisymmetric configuration provides a simplified path to advancing our understanding of critical aspects of resonant magnetic perturbation suppression of edge localized modes, error field correction, and locked mode disruption avoidance. However, initial comparisons of the measured poloidal mode number to theory have not produced quantitative agreement. Possible sources of discrepancy are explored through improved modeling, new experimental data, and use of the new 3D magnetic and 2D reflectometric diagnostics on DIII-D.

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