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3D magnetic geometric effects during 3D field application and comparison to measurements in DIII-D[1] R.S. WILCOX, E.A. UNTERBERG, A. WINGEN, M.W. SHAFER, M.R. CIANCIOSA, D.L. HILLIS, ORNL, G.R MCKEE, U. of Wisc., T.M. BIRD, T.E. EVANS, GA — Density pumpout during the application of 3D fields in tokamaks may be caused by changes to the plasma equilibrium shaping that destabilize microinstabilities, thereby increasing transport.[2] Local geometric quantities of the magnetic field that are relevant for microinstabilities (curvature and local shear) are calculated using VMEC equilibria in typical RMP discharges on DIII-D. Measurements of phase-differenced soft X-ray emission in the pedestal region show a clear helical structure that is compared with a model of localized impurity transport based on the 3D geometry. Broadband density fluctuations measured by beam emission spectroscopy also show changes in magnitude with I-coil phase, in support of the theory that microstability changes with the magnetic geometry. A scan of 3D equilibria over a large range of DIII-D geometric parameter space has been preformed in order to map out the operating space of the microstability mechanism.

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[2]T.M. Bird, PoP 21 (2014) 100702.

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