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Measurements of Magnetic Topology During 3D Magnetic Perturbations in the X-point Region of DIII-D[1] E.A. UNTERBERG, M.W. SHAFER, A. WINGEN, J.H. HARRIS, D.L. HILLIS, ORNL, T.E. EVANS, N.M. FERRARO, GA — 2D imaging of soft x-ray (SXR) emission near the X-point region of a diverted, H-mode tokamak show experimental evidence of helical structures inside the separatrix when non-axisymmetric fields are applied. The helical structures are measured to be in the steep-pressure-gradient region, have poloidal mode number $m = 11 \pm 1$, and have a spatial extent of 5 cm near the X point region. These data characteristics match calculations using the two-fluid, resistive MHD code, M3D-C1, which self-consistently accounts for the on and off resonant plasma response. These calculations are also consistent with displacements in edge Thomson Scattering data. This quantitative evaluation of boundary and internal plasma displacements through comparisons between data and modeling provide valuable insight into the details of how applied 3D magnetic perturbations affect edge stability, in general, and how resonant magnetic perturbations affect ELM stability, in particular.

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E.A. Unterberg
Oak Ridge National Laboratory

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