

Abstract Submitted
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Reconstruction of 3D VMEC equilibria with helical cores in DIII-D¹ A. WINGEN, R.S. WILCOX, M.R. CIANCIOSA, S.K. SEAL, E.A. UNTERBERG, S.P. HIRSHMAN, ORNL, P. PIOVESAN, Consorzio RFX, Italy, F. TURCO, Columbia University — A helical core is a feature accessible by high performance hybrid discharges. It becomes dominant, if the 3/2 tearing mode, typically dominating hybrid discharges, is suppressed. It has been experimentally verified in ASDEX-U, and recently in DIII-D. The VMEC/V3FIT codes allow for 3D reconstruction, which is shown here for the first time in a tokamak. The reconstructed helical core equilibrium can be used to numerically study the properties of an experimentally observed helical core. The helical core is a saturated internal kink, excited by 3D perturbation fields and driven primarily by the pressure gradient near $q = 1$. It is bifurcated from an axisymmetric state by 3D fields. It flattens the q -profile in the core, potentially stabilizing sawteeth. It contributes to flux pumping, which broadens the current density profile. This analysis will help to determine possible benefits or disadvantages for the high beta hybrid scenario.

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