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Intrinsic Axial Flows in CSDX and Dynamical Symmetry Breaking in ITG Turbulence[1] JIACONG LI, P.H. DIAMOND, Univ of California - San Diego, CMTFO, CASS and CER, R. HONG, S.C. THAKUR, Univ of California - San Diego, CER, X.Q. XU, Lawrence Livermore National Laboratory, G.R. TYNAN, Univ of California - San Diego, CER — Toroidal plasma rotation can enhance confinement when combined with weak magnetic shear [Mantica, PRL, 2011]. Also, external rotation drive in future fusion devices (e.g. ITER) will be weak. Together, these two considerations drive us to study intrinsic rotations with weak magnetic shear. In particular, a global transition is triggered in CSDX when magnetic field B exceeds a critical strength threshold [Cui, PoP, 2016]. At the transition an ion feature emerges in the core turbulence. Recent studies show that a dynamical symmetry breaking mechanism in drift wave turbulence [Li, PoP, 2016] can drive intrinsic axial flows in CSDX, as well as enhance intrinsic rotations in tokamaks. Here, we focus on what happens when ion features emerge in CSDX, and how ion temperature gradient (ITG) driven turbulence drives intrinsic rotations with weak magnetic shear. The effect of dynamical symmetry breaking in ITG turbulence depends on the stability regime. In a marginally stable regime, dynamical symmetry breaking results in an augmented turbulence viscosity (chi-phi). However, when ITG is far from the stability boundary, a negative increment in turbulent viscosity is induced.

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