Abstract Submitted
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Symmetry Breaking by Parallel Flow Shear JIACONG LI, PATRICK DIAMOND, Univ of California - San Diego — Plasma rotation is important in reducing turbulent transport, suppressing MHD instabilities, and is beneficial to confinement. Intrinsic rotation without an external momentum input is of interest for its plausible application on ITER. $k_{\|}$ spectrum asymmetry is required for residual Reynolds stress that drives the intrinsic rotation. Parallel flows are reported in linear devices without magnetic shear. In CSDX, parallel flows are mostly peaked in the core [Thakur, et al. 2014]; more robust flows and reversed profiles are seen in PANTA [Oldenburger, et al. 2012]. A novel mechanism for symmetry breaking in momentum transport is proposed. Magnetic shear or mean flow profile are not required. A seed parallel flow shear (PFS) sets the sign of residual stress by selecting certain modes to grow faster. The resulted spectrum imbalance leads to a nonzero residual stress, which further drives a parallel flow with ∇n as the free energy source, adding to the shear until saturated by diffusion. Balanced flow gradient is set by $\Pi_{\|}^{Res}/\chi_{\phi}$. Residual stress is calculated for ITG turbulence and collisional drift wave turbulence where electron-ion and electron-neutral collisions are discussed and compared. Numerical simulation is proposed for testing the effect of PFS.

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