Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Competition of Perpendicular and Parallel Flows in a Straight Magnetic Field[1] JIACONG LI, PATRICK DIAMOND, RONGJIE HONG, GEORGE TYNAN, Univ of California - San Diego — In tokamaks, intrinsic rotations in both toroidal and poloidal directions are important for the stability and confinement. Since they compete for energy from background turbulence, the coupling of them is the key to understanding the physics of turbulent state and transport bifurcations, e.g. L-H transition. $V_\perp$ can affect the parallel Reynolds stress via cross phase and energetics, and thus regulates the parallel flow generation. In return, the turbulence driven $V_\parallel$ plays a role in the mean vorticity flux, influencing the generation of $V_\perp$. Also, competition of intrinsic azimuthal and axial flows is observed in CSDX-a linear plasma device with straight magnetic fields. CSDX is a well diagnosed venue to study the basic physics of turbulence-flow interactions in straight magnetic fields. Here, we study the turbulent energy branching between the turbulence driven parallel flow and perpendicular flow. Specifically, the ratio between parallel and perpendicular Reynolds power decreases when the mean perpendicular flow increases. As the mean parallel flow increases, this ratio first increases and then decreases before the parallel flow shear hits the parallel shear flow instability threshold. We seek to understand the flow states and compare with CSDX experiments.

[1]This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Fusion Energy Sciences, under Award Number DE-FG02-04ER54738.

Jiacong Li
Univ of California - San Diego

Date submitted: 12 Jul 2017 Electronic form version 1.4