Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Impacts of Shear Flow on the Low-n Kink Instabilities JIANGUO CHEN, Peking University, XUEQIAO XU, Lawrence Livermore National Laboratory — We report the progress on studies of the effects of shear flow on the edge instabilities using the reduced 3-field two fluid MHD model under the BOUT++ framework. Using the equilibrium profiles in JET-like Tokamak geometry with a circular cross section, the results of simulations demonstrate that: (1) the low-n peeling modes are mainly driven by the gradient of parallel current and the large pressure gradient leads to high-n ballooning modes; (2) in low density cases, the low-n kink modes are sensitive to the Er shear; (3) using the shear flow's profiles measured from DIII-D experiment, the intermediate-n modes(n$\sim$20) are triggered firstly and the peak of it shifts to low-n mode with narrower mode spectrum when increasing the shear flow in the linear simulation; (4) the nonlinear results show the enhanced nonlinear mode-mode interaction in saturate phase and are quantitatively consistent with the transition from coherent harmonic oscillation(EHO) to the broad band turbulence state discovered in DIII-D discharge with net-zero NBI torque[1] and the QH-mode can be achieved by NBI in both co- and counter direction. It's significant for understanding the mechanism of EHO and QH-mode.

[1]K. H. Burrell, et al., *Phys. Plasmas* **23**, 056103 (2016).

Jianguo Chen
Peking University

Date submitted: 13 Jul 2016 Electronic form version 1.4