Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Experimental validation by global gyrokinetic particle simulation
YONG XIAO, TAIGE ZHANG, IFTS, Zhejiang University, China, ZHIHONG LIN, UC Irvine — It is observed in modern gyrokinetic simulations that the heat and particle transport arising from the EXB turbulent motion is approaching to the anomalous transport level in tokamak experiments. However, most of these gyrokinetic simulations are carried out by some simplifications, such as circular cross section, approximate local temperature and density and their gradients, local flux-tube limit, etc. Eliminating these simplifications is very likely to improve the predictability of the numerical simulations. The new features lately developed in the global gyrokinetic particle simulation code GTC, such as kinetic electrons, electromagnetic effects, non-circular plasma shape and global instability drives, enable the GTC code to simulate the turbulent transport with better fidelity when comparing to real experiments. The GTC simulation is compared with DIII-D experiment and GYRO simulation with a result of consistent turbulent transport level between them. We also provide a first estimate of turbulent transport level in EAST experiment. Many important physics issues in the global turbulent transport, such as the dominance of trapped electron modes, turbulence spreading, electron transport mechanism and zonal flow effects can be addressed by the new features of the GTC code with a closer relevance to the tokamak experiments.

Yong Xiao
IFTS, Zhejiang University, China

Date submitted: 12 Jul 2013 Electronic form version 1.4