Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

ETG turbulence simulation of tokamak edge plasmas via 3+1 gyrofluid code[1] P.W. XI, Peking University, China, X.Q. XU, A. DIMITS, M. UMANSKY, I. JOSEPH, Lawrence Livermore National Lab, S.S. KIM, National Fusion Research Institute, Korean — To study ETG driven turbulence at H-mode pedestal, which is important for the magnetic reconnection of ELM dynamics via ETG-MHD interaction, a 3+1 gyrofluid code is developed under BOUT++ framework. Four evolving quantities are density, parallel velocity, parallel pressure and perpendicular pressure for electron and adiabatic ion is used. Gyro-average is done by utilizing Padé approximation and parallel Landau closure for Landau damping is implemented by using a newly developed non-Fourier method. By calculating the ETG mode growth rate and real frequency for the ETG cyclone equilibrium, our code is benchmarked with gyrokinetic codes. We also calculated the electron heat transport level at turbulence saturation phase for both cyclone case and H-mode pedestal. Because the pedestal width is typically ten times larger than ETG simulation domain, the three different region of pedestal, i.e. pedestal top, peak gradient region and pedestal bottom, are simulated separately. The dramatic difference on magnetic shear and temperature length scale of these three regions lead to different ETG linear and nonlinear behaviors.

[1]This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Security, LLC, Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344, and is supported by the China Scholarship Committee.

P.W. Xi
Peking University, China

Date submitted: 11 Jul 2012 Electronic form version 1.4