Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Gyrokinetic particle simulations of microturbulence in reversed shear plasmas WENJUN DENG, ZHIHONG LIN, University of California, Irvine — Electrostatic ion temperature gradient (ITG) and trapped electron mode (TEM) turbulence in tokamak plasmas with reversed magnetic shear is studied by particle-in-cell (PIC) simulations using Gyrokinetic Toroidal Code (GTC). In the ITG turbulence, electrostatic potential gaps are observed in the minimum-q region in the linear phase when $q_{\min}$ is an integer. The mode rational surface distributions are investigated. When $q_{\min}$ is an integer, some rational surfaces degenerate at the minimum-q position, forming two gaps in which there's no rational surface. The potential gap has similar size as the rational surface gaps, confirming previous theories of weakening of toroidal coupling by rarefaction of rational surfaces, which generates a gap in the global mode structure. In the TEM turbulence, the mode grows only in the positive-shear side in the linear phase, because electron precession drift velocity is decreased or reversed in the negative-shear side, breaking the precessional resonance. In the non-linear phase of both ITG and TEM turbulence, turbulence spreads into linearly stable regions. Whatever structure formed in the linear phase is destroyed. The fluctuation and transport have no significant gap across the $q_{\min}$ region even when $q_{\min}$ is an integer.

Wenjun Deng
University of California, Irvine

Date submitted: 16 Jul 2009 Electronic form version 1.4