Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Tempest simulations of kinetic GAM mode and neoclassical turbulence[1] X.Q. XU, A.M. DIMITS, LLNL, ESL TEAM — TEMPEST is a nonlinear five dimensional (3d2v) gyrokinetic continuum code for studies of H-mode edge plasma neoclassical transport and turbulence in real divertor geometry. The 4D TEMPEST code correctly produces frequency, collisionless damping of GAM and zonal flow with fully nonlinear Boltzmann electrons in homogeneous plasmas. For large q=4 to 9, the Tempest simulations show that a series of resonance at higher harmonics $v_{||} = \omega_G q R_0/n$ with n=4 become effective. The TEMPEST simulation also shows that GAM exists in edge plasma pedestal for steep density and temperature gradients, and an initial GAM relaxes to the standard neoclassical residual with neoclassical transport, rather than Rosenbluth-Hinton residual due to the presence of ion-ion collisions. The enhanced GAM damping explains experimental BES measurements on the edge q scaling of the GAM amplitude. Our 5D gyrokinetic code is built on 4D Tempest neoclassical code with extension to a fifth dimension in toroidal direction and with 3D domain decompositions. Progress on performing 5D neoclassical turbulence simulations will be reported.

[1]Work performed for U.S. DOE by U.C. LLNL under Contract W7405-ENG-48.

X. Q. Xu
LLNL

Date submitted: 23 Jul 2007 Electronic form version 1.4