Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Tempest Neoclassical Simulation of Fusion Edge Plasmas[1] X.Q. XU, Z. XIONG, B.I. COHEN, R.H. COHEN, M. DORR, J. HITTINGER, G.D. KERBEL, W.M. NEVINS, T.D. ROGNLIEN, LLNL — We are developing a continuum gyrokinetic full-F code, TEMPEST, to simulate edge plasmas. The geometry is that of a fully diverted tokamak and so includes boundary conditions for both closed magnetic flux surfaces and open field lines. The code, presently 4-dimensional (2D2V), includes kinetic ions and electrons, a gyrokinetic Poisson solver for electric field, and the nonlinear Fokker-Planck collision operator. Here we present the simulation results of neoclassical transport with Boltzmann electrons. In a large aspect ratio circular geometry, excellent agreement is found for neoclassical equilibrium with parallel flows in the banana regime without a temperature gradient. In divertor geometry, it is found that the endloss of particles and energy induces pedestal-like density and temperature profiles inside the magnetic separatrix and parallel flow stronger than the neoclassical predictions in the SOL. The impact of the X-point divertor geometry on the self-consistent electric field and geo-acoustic oscillations will be reported. We will also discuss the status of extending TEMPEST into a 5-D code.

[1]Performed for US DOE by LLNL under Contract W-7405-ENG-48.

X.Q. Xu
LLNL

Date submitted: 13 Jan 2006 Electronic form version 1.4