Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Perturbed particle orbits and kinetic plasma response in non-axisymmetric tokamaks[1] KIMIN KIM, J.-K. PARK, PPPL, A.H. BOOZER, Columbia University, N.C. LOGAN, Z.R. WANG, J.E. MENARD, PPPL — Non-axisymmetric magnetic fields interact with the drift trajectories of ions and electrons to create an anisotropic plasma pressure. The force produced by the gradient of this anisotropic pressure produces a torque, the Neoclassical Toroidal Viscosity (NTV), which tends to relax the plasma rotation to a specific offset rotation, and modifies the energy required to perturb the plasma. Complexities, such as resonances of the ExB drift with particle bounce frequencies, finite orbit width, and full collisional effects, require full numerical simulation to determine the NTV and the perturbation energy. The POCA delta-f drift kinetic particle code has been used to: (1) demonstrate the existence of the bounce resonances with the ExB drift and show that they often dominate the magnitude of the NTV, (2) show the NTV of perturbations with different toroidal mode numbers are generally decoupled, and (3) verify a quadratic NTV dependence on the asymmetric magnetic field. Such results imply the pressure anisotropy is linear in the magnetic perturbation and can produce a significant change in the applied non-axisymmetric field. Progress on integrating this pressure anisotropy into a perturbed equilibrium solver to obtain self-consistent solutions is presented.

[1]This work was supported by US DOE Contract DE-AC02-09CH11466.

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Date submitted: 11 Jul 2014 Electronic form version 1.4