Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Resonances in drift-kinetic particle motions in perturbed tokamaks and their impact on neoclassical toroidal viscosity transport KIMIN KIM, JONG-KYU PARK, Princeton Plasma Physics Laboratory, ALLEN BOOZER, Columbia University — Neoclassical toroidal viscosity (NTV) transport in perturbed tokamaks is driven by the net radial drift of particles across flux surfaces due to the nonaxisymmetric magnetic perturbations. The complicated interactions between drift-kinetic orbits and magnetic perturbations can be elucidated by accurately tracking the guiding-center particle motions [1]. This presentation will show that the perpendicular motion by ExB precession can largely suppress radial particle drifts by phase-mixing, but the phase-mixing can disappear if the ExB increases further such that it resonates with the parallel motion, which is called the bounce-harmonic resonance [2]. The bounce-harmonic resonance can significantly change the NTV in the presence of ExB, and thereby is the main driving mechanism of NTV transport. It will be discussed that the drift-kinetic orbit resonance should be adequately considered to calculate the anisotropic pressure tensor for self-consistent perturbed equilibrium. This work was supported by DOE Contract DE-AC02-09CH11466.

[1] K. Kim et al., Phys. Plasmas 19, 082503 (2012)
[2] K. Kim et al., Phys. Rev. Lett. 110, 185004 (2013)

Kimin Kim
PPPL

Date submitted: 12 Jul 2013 Electronic form version 1.4