Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Neoclassical Toroidal Plasma Viscosity in the Vicinity of an Island in Tokamaks N.T. ISLAND, K.C. SHAING, Plasma and Space Science Center, National Cheng Kung University, S.A. SABBAGH, Columbia University, M.S. CHU, General Atomics — It is known that the broken toroidal symmetry in $|\boldsymbol{B}|$ spectrum caused by the presence of the error fields and magnetohydrodynamic (MHD) activities in tokamaks enhances totoidal flow damping rate through the neoclassical toroidal viscosity. Recent extensions of the theory for the neoclassical toroidal plasma viscosity for non-resonant perturbations are generalized to calculate the symmetry breaking induced plasma viscosity in the vicinity of a rotating island. Specifically, the effects of orbit squeezing, collisional boundary layer, collisionless detrapping-retrapping, drift resonance caused superbananas, and bounce-transit and drift resonance are now included to complete the original theory. The results can be compared with experimental measurements of the flow damping rate in the vicinity of the islands. This extensive theory will form a basis for the further development of the island rotation theory in tokamaks.

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Date submitted: 21 Jul 2009 Electronic form version 1.4