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Application of GTC-Neo neoclassical transport code for realistic tokamak cases[1] G. REWOLDT, W.X. WANG, J. MANICKAM, W.M. TANG, Princeton Plasma Physics Lab — The GTC-Neo neoclassical transport code [W.X. Wang, et al, Comp. Phys. Commun. 164, 178 (2004)] calculates neoclassical transport quantities for tokamaks, including particle, momentum, and energy fluxes, poloidal velocities, and radial electric fields. It is interfaced with numerically-calculated non-circular-cross-section MHD equilibria. Unlike previous calculations, it includes effects of finite orbit width (banana width), for both standard and non-standard orbits. Using input data from experimentally-derived TRANSP calculations, the GTC-Neo code has now been applied to nine NSTX shots, in both L- and H-modes, and one DIII-D shot. The GTC-Neo simulations suggest that there may exist nonlocal features in the ion neoclassical transport for NSTX plasmas. There is additional "nonlocal smoothing" in the ion heat flux profile. While GTC-Neo results are sometimes comparable to standard (NCLASS) neoclassical results, the included finite-orbit-width effects generally bring the simulated ion heat transport closer to the experimental measurements. For an ITB case, GTC-Neo gives a larger electric field peak than NCLASS, at the ITB location. A limitation of the GTC-Neo code now is the inclusion only of electrons and one hydrogenic ion species; it is planned to add an impurity species to the GTC-Neo calculation in future work.

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