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Calculation of Non-ambipolar Transport in Tokamaks JONG-KYU PARK, Princeton Plasma Physics Laboratory, ALLEN BOOZER, Columbia University, JONATHAN MENARD, Princeton Plasma Physics Laboratory — Small non-axisymmetric perturbations of the magnetic field can greatly change the performance of tokamaks through non-ambipolar transport. The recently generalized analytic calculations of the non-ambipolar transport have shown that the consistency between theory and experiment can be significantly improved by two effects [J.-K. Park, et al., "Non-ambipolar Transport by Trapped Particles in Tokamaks," Phys. Rev. Lett. (2009), To be published] : (1) The small fraction of trapped particles for which the bounce and precession rates of particles resonate. (2) The non-axisymmetric variation in the field strength along the perturbed magnetic field lines rather than along the unperturbed magnetic field lines. Most apparent effects can be found in toroidal momentum transport, and thus by a torodial rotational damping associated with Neoclassical Toroidal Viscosity (NTV). Various experiments for NTV rotation braking in NSTX and DIII-D will be compared with theoretical predictions, and the expected sensitivity of ITER to non-axisymmetries will be presented. Also, the effects of non-axisymmetic field on particle and heat transport will be discussed with regard to ELM suppressions. This work was supported by DOE contract DE-AC02-76CH03073 (PPPL), and DE-FG02-03ERS496 (CU).

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