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Low Collisionality Neoclassical Toroidal Viscosity in Tokamaks and Quasi-symmetric Stellarators[1] A.J. COLE, C.C. HEGNA, J.D. CALLEN, University of Wisconsin — Non-resonant magnetic perturbations can affect plasma rotation in toroidally confined plasmas through their modification to $|B|$. Variations along a field line induce nonambipolar radial transport and produce a global neoclassical toroidal viscous force [NTV]. In this work, previously calculated radial particle fluxes for the low-collisionality "ν" and "$1/\nu$" regimes [1] are unified into a single particle flux (or toroidal viscous force). Provided pitch-angle scattering dominates over collisional energy exchange, the energy component of phase space can be decoupled into independent regions ($E > E_c$ for ν regime, $E < E_c$ for $1/\nu$ regime, with E_c determined by $\nu_i(E_c) = \epsilon\,\omega_E$) within which the perturbed distribution function can be calculated similar to [1]. Using a technique first employed in axisymmetric neoclassical theory [2], the smoothed particle flux is constructed by summing the partial contributions from ν and $1/\nu$ banana drift effects respectively. The complete NTV force is expressed in terms of the equilibrium flows and a temperature-gradient-determined "intrinsic" flow. [1] K.C. Shaing, Phys. Plasmas, **10**, 1443 (2003). [2] K.T. Tsang, and J.D. Callen, Phys. Fluids **19**, 667 (1976).

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