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Advances in Neoclassical Theory of Poloidal and Toroidal Rotation in Tokamaks[1] CHEONHO BAE, WESTON STACEY, Georgia Institute of Technology, WAYNE SOLOMON, Princeton Plasma Physics Laboratory — Rotation of tokamak plasmas is of intrinsic interest and also important for stabilization of MHD instabilities. Neoclassical rotation theory and gyroviscosity both depend on the poloidal dependence of the magnetic flux surface geometry. Gyroviscosity in the circular flux surface formulation [1] was found to lead to over-prediction of toroidal rotation velocities in DIII-D by a factor of about 2. We now represent neoclassical plasma rotation theory in the more accurate "Miller equilibrium" flux surface geometry [2] for comparison with DIII-D discharges. The advanced rotation theory with the Miller model takes into account Shafranov shift, elongation, and triangularity of flux surfaces. Development of the neoclassical plasma rotation theory for both the circular and Miller equilibrium models is complete and will be presented. Initial comparisons of the improved circular model rotation calculation with experiment show improved agreement with experiment. Additional calculations based on the Miller equilibrium model are in progress.

[1] W.M. Stacey, et al., Phys. Plasma **13**, 062508 (2006).
[2] R.L. Miller, et al., Phys. Plasmas **5**, 973 (1998).

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