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Turbulent-driven intrinsic rotation in tokamak plasmas MICHAEL BARNES, Institute for Fusion Studies, UT-Austin, FELIX PARRA, University of Oxford, JUNGPYO LEE, Courant Institute, NYU, EMILY BELLI, General Atomics, FILOMENA NAVE, Instituto Superior Tecnico, ANNE WHITE, Plasma Science and Fusion Center, MIT — Tokamak plasmas are routinely observed to rotate even in the absence of an externally applied torque. This "intrinsic" rotation exhibits several robust features, including rotation reversals with varying plasma density and current and rotation peaking at the transition from low confinement to high confinement regimes. Conservation of toroidal angular momentum dictates that the intrinsic rotation is determined by momentum redistribution within the plasma, which is dominated by turbulent transport. The turbulent momentum transport, and thus the intrinsic rotation profile, is driven by formally small effects that are usually neglected. We present a gyrokinetic theory that makes use of the smallness of the poloidal to total magnetic field ratio to self-consistently include the dominant effects driving intrinsic turbulent momentum transport in tokamaks. These effects (including slow radial profile variation, slow poloidal turbulence variation, and diamagnetic corrections to the equilibrium Maxwellian) have now been implemented in the local, delta-f gyrokinetic code GS2. We describe important features of the numerical implementation and show numerical results on intrinsic momentum transport that are qualitatively consistent with experimental rotation reversals.

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