Turbulent generation of poloidal rotation and self consistent plasma dynamics

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Abstract

A simple transport model describing the generation of anomalous toroidal and poloidal plasma rotation in addition to density and pressure profile evolution is introduced. The model is self-consistent in the sense that while it relies on Er shear for generation of toroidal rotation, it also takes a simple algebraic form that describe the depletion of turbulence caused by Er shear, and solve the poloidal ion momentum equation together with the radial force balance relation. Basic mechanisms for the generation of poloidal and toroidal sheared flows are described, and their coupled evolution is studied using this simple transport model. The full study involves a rigorous gyrokinetic derivation, and numerical solutions of the simple 1-D transport model. Notice that the simple model allows parameter scans that require many runs. The results of this study will be presented.

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