

Turbulent generation of poloidal rotation and self consistent plasma dynamics

Ö. D. Gürçan* and P. H. Diamond

*Center for Astrophysics and Space Sciences,
University of California, San Diego,
9500 Gilman Dr., La Jolla, CA92093-0424*

T. S. Hahm

Princeton Plasma Physics Laboratory, Princeton, NJ 08543-0451 USA

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 E_r shear for generation of toroidal rotation, it also takes a simple algebraic form that describe the depletion of turbulence caused by E_r 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.

*Electronic address: ogurcan@ucsd.edu; URL: <http://diamnd.ucsd.edu>