Effects of Flux Surface Shape on Turbulent Transport and A Modification of the Split-weight Scheme

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Abstract. GEM[1] is a gyrokinetic simulation code for studying drift-wave turbulence and kinetic tearing modes. It is an explicit δf particle code that has fully kinetic electron dynamics and magnetic field perturbations. In this presentation the implementation of general equilibrium, in particular the Miller equilibrium model [2], using the field-line-following coordinates will be described. Equilibrium quantities such as the Jacobian, poloidal field strength, etc., are computed and stored as numerical tables during initialization, and are evaluated at the particle locations through interpolation. Effects of flux surface shape on drift-wave turbulence will be studied, in parallel to a previous study using gyro-fluid simulations [3]. It is observed that elongation can have a strong stabilizing effect, and significantly shift the Dimits' Shift region toward larger R/L_T.

We will also describe a modification of the split-weight scheme [4], in which the adiabatic electron term $n_0\frac{e\phi}{T_e}$ in the quasineutrality condition is computed using the numerically evolved marker distribution, similar to the $\frac{\omega_{pe}^2}{c^2}A_{||}$ term in the Ampere's equation [Ref. 1]. This modification has little effects on the most unstable modes, but can have small effect on the long wavelength zonal flow modes and consequently can change the turbulent flux if the saturated turbulence is dominated by such flows.

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