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Theory Experiment

A New Formulation of the Quasi-linear Transport Theory for the Trapped Gyro Landau Fluid Model,* G.M. Staebler, J.E. Kinsey, and R.E. Waltz, *General Atomics* – A quasi-linear model of turbulence evaluates the bilinear fluctuation driven fluxes using linearly unstable eigenmodes. A model for the saturated amplitude of the turbulence is used to complete the flux calculation. It is traditional to normalized the fluxes by the amplitude of the electrostatic potential (ϕ -norm) induced by the linear eigenmode. This is the formulation used in the GLF23 model and in the recently published Trapped Gyro-Landau Fluid (TGLF) model [1]. The normalization of the fluxes is not unique. A variety of alternate choices for normalization have been tested with a large database (>150 runs) of non-linear gyrokinetic simulations using the GYRO code. It was found that several alternate choices give much better fits to this database than the ϕ -norm for simple mixing length saturation formulas. Using the modulus of the whole linear eigenvector for the TGLF equations as the norm (v -norm) gives a nearly optimum fit to GYRO. This v -norm version of the model fits both s -alpha and shaped Miller geometries

[1] G.M. Staebler, *et al.*, Phys. Plasma **14**, 055909 (2007).

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