

## Comparison of GLF23 and Weiland Models for Turbulent-Driven Toroidal Momentum Transport

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Integrated modeling simulations using the GLF23 model indicate that the  $\mathbf{E} \times \mathbf{B}$  shear driven by toroidal rotation can have a significant impact upon the fusion performance of ITER [1]. The focus of this work is to advance the understanding of toroidal momentum transport by carrying out a systematic comparison of the toroidal momentum diffusivity computed by the GLF23 [2] and Weiland [3] models. The GLF23 model is used to compute toroidal momentum transport driven by ion temperature gradient (ITG) and trapped electron mode (TEM) in the quasilinear approximation. The Weiland model, in addition to ITG/TEM toroidal momentum transport in the quasilinear approximation, includes non-linear contributions to transport such as a momentum pinch effect that is driven by the Reynolds stress. Benchmarking of both momentum transport models against experimental data is carried out with the PTRANSP code. Also, a direct comparison between GLF23 and the Weiland model is also carried out using a stand-alone code, where the parametric dependence of the momentum diffusivities can be determined in a straightforward manner. The variation of toroidal momentum transport with respect to plasma parameters such as temperature gradient, radial gradient of toroidal velocity, plasma beta, collisionality, and magnetic shear is examined. The  $\mathbf{E} \times \mathbf{B}$  flow shear that is needed to stabilize anomalous transport depends on the threshold and stiffness of the transport models.

[1] G.M. Staebler and H.E. St. John, Nucl. Fusion 46 (2006) L6.

[2] R.E. Waltz *et al.*, Physics of Plasmas 4 (1997) 2482.

[3] J. Weiland and H. Nordman, Proc. 33rd EPS Conf. on Plasmas Physics, ECA Vol 30I, P2.186 (2006).