Driftwave Growth Rate Comparisons Between the GLF23 Transport Model and Real Geometry Gyrokinetic Stability Calculations

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The GLF23 transport model [1] was derived for circular geometry $s-\alpha$ model and normally applied in the electrostic limit. Transport from the model vanishes when the $E \times B$ shear rate ($\gamma_{\rm E}$) exceeds the maximum growth rate ($\gamma_{\rm max}$). The model has been successful in reproducing the observed profiles in a wide range of L–, H–mode, and Internal Transport Barrier discharges [2]. Over nearly a hundred shots from DIII–D, TFTR, and JET, the RMS error in the incremental confinement time (excluding the pedestal) is within 15%. Nevertheless, there is some indication that model overpredicts the thermal transport for L–mode discharges where the $E \times B$ shear effects are smaller and the net growth rates ($\gamma_{\rm max} - \gamma_{\rm E}$) is larger suggesting the model could be improved with more accurate growth rates and thresholds. Work is now underway to compare the linear growth rates from the model against a version of the GKS gyrokinetic stability code [3] extended to real geometry using a local equilibrium model by Miller *et al.* [4]. Systematic parameter scans are conducted to compare the GLF23 rates against the GKS rates in both $s - \alpha$ and real geometry in order to assess the effects of plasma shaping on the growth rates. Possible extensions of the GLF23 transport model are considered in order to capture at least some of the dependencies of non–circular geometry. In particular, an effective B–field increasing linearly with elongation [5] is considered. This alters the gyro-radius resulting in a lower diffusivity at higher elongation.

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