Comparison of Critical Values of R/L_{T_e} for ETG Modes Based on an Analytic Expression With GKS Simulations for DIII-D Discharges*

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Understanding electron thermal transport remains a key area of study in the overall understanding of transport in tokamak plasmas. Electron temperature gradient modes were initially thought to be too small a spatial scale to result in significant levels of electron heat flux but more recently it was recognized that coupling of these modes to form so called streamers can result in greatly increased levels of electron heat flux. A simple analytic expression has been developed [1] for the linear critical temperature gradient for ETG modes which when limited to discharges without reverse magnetic shear and steep gradient regions is similar to the streamer onset condition. Results from this simple expression will be compared to results from analysis with a detailed gyrokinetic stability code, GKS, with treatment of noncircular geometry for a variety of discharges in DIII-D. For the discharges studied the simple expression yields values of R/L_{T_e} somewhat below those determined from GKS analysis but the feature of being relatively flat over a rather large region in the plasma core is similar. The two most important terms in the expression depend on T_e/T_i and the ratio of magnetic shear to safety factor. This simple expression can prove useful when designing experiments to test for dependencies on ETG mode turbulence.

[1] F. Jenko, *et al.*, Phys. Plasmas **8**, 4096 (2001).

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