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Extending Critical Balance to ITG-Driven Turbulence With Flow Shear in Fusion Plasmas

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Scaling laws derived from the critical balance conjecture are substantiated with numerical results for a range of temperature gradients and flow shear. These scalings are tested using spatial and temporal correlation analysis. In the presence of flow shear, we observe how flows hear-independent scaling laws are modified. Analytic modifications are made to the critical balance scalings, incorporating the effects of flow shear. Additionally, we analyze an asymmetry in how the system responds to a flow shear; preliminary results suggest that the system changes in its parallel and temporal scales, but remains invariant in the perpendicular plane.

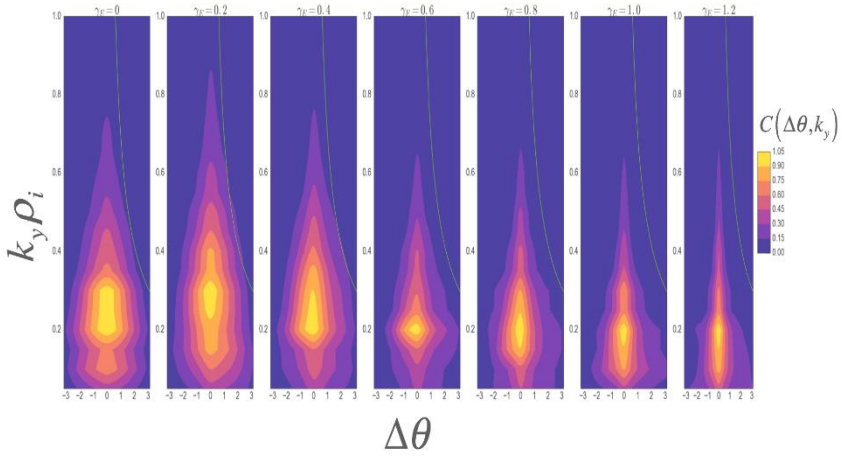

Figure 1: *Parallel density correlation function as a function of k_y and $\Delta\theta$, the distance along the field line. Each subplot is for a fixed flow shear, γ_E, where γ_E ranges from 0 to 1.2, left to right. The narrowing of the correlation function indicates a shortening of the parallel turbulent length scales.*

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