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-title-
ETG Turbulence Isotropization
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-abstract-
Electron temperature gradient (ETG) instabilities drive electron-scale turbulence in tokamak plasmas. This turbulence is characterized in gyrokinetic simulations by anisotropic "streamers" which persist into the saturated turbulent state and produce experimentally relevant energy transport [Dorland00]. On the other hand, simple fluid models [TerryHorton83] show that the ExB nonlinearity causes rotation in k-space and isotropic spectra. These qualitative features are demonstrated using the gyrokinetic code GENE running in the ETG regime, and in a 2-D pseudo-spectral Hasegawa-Mima model initiated with streamers. We plan to compare to nonlinear, toroidal, gyrokinetic theory, and analysis of what experimental regimes lead to streamers and substantial electron heat transport. We also provide evidence of spontaneous zonal flow generation in GENE, which will be shown by the aforementioned theory to be a result of a modulational instability involving the unstable ETG modes.
W. Dorland, et al., PHys. Rev. Lett. **85** 5579 (2000)
P. W. Terry, W. Horton, Phys. Fluids **26** 106 (1983)
-/abstract-