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Statistical Theory for Energy Distribution in Gyrokinetic Turbulence P.W. TERRY, University of Wisconsin-Madison, D.R. HATCH, J.-H. KIM — Recent gyrokinetic simulations reveal that ITG turbulence excites a large number of damped modes in the wavenumber range of the instability. These dissipative structures engage in an equipartition of dissipated power across the modes of a singular value decomposition (SVD). Energy injected by the instability is simultaneously distributed among all modes. Equipartition is enforced by the large multiplicity of couplings among damped modes, the uniformity of coupling strengths from mode to mode, the propensity for ergodization in individual triads, and the relatively large damping rates. Through the concept of turbulent dissipative contact among separate decompositions, we derive the probability distribution function of dissipated power in any mode and the entropy of the system. We study the effect of different basis decompositions on equipartition. Because the system is dissipative but turbulent, energy not lost to dissipation in a turbulent decorrelation time progresses to smaller scales via a wavenumber cascade. At high k the dissipation rate becomes smaller than the turbulent correlation rate, yielding a power law spectrum asymptotically.

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