Abstract Submitted
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Role of Energy-Transfer Resonance in the Dimits Shift for a Threshold ITG Model/[1] P.W. TERRY, P.-Y. LI, University of Wisconsin - Madison, M.J. PUESCHEL, University of Texas at Austin, G.G. WHELAN, University of Wisconsin - Madison — The role of resonant energy transfer to large-scale stable modes in the upshift of the critical gradient for ion temperature gradient turbulence is examined. Measurements of spectral energy transfer in gyrokinetic simulations above and below the nonlinear critical gradient show that the saturation mechanism is the same in both regimes, differing primarily in magnitude of transfer rate. Consequently the nonlinear saturation theory for transfer from the unstable mode through the zonal flow to a nearly conjugate stable mode, which has been shown to work well away from the threshold, can be extended to include the threshold by consistent treatment of magnetic-drift physics. Prior estimates of saturation level are expanded to include the levels of the stable mode and the cross correlation of the unstable and stable mode amplitudes, as well as less restrictive treatments of wavenumber summations. Resonance in the triplet correlation time is shown to produce efficient energy transfer and a low heat flux above the linear critical gradient. Resonance broadening by the ion polarization drift uncovers the gradient dependence of the triplet correlation time. This and the nonlinear coupling coefficient allow the flux to rise sharply at a higher gradient value than the linear threshold.

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