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Towards a better understanding of critical gradients and near-marginal turbulence in burning plasma conditions[1] C. HOLLAND, University of California, San Diego, J. CANDY, General Atomics, N.T. HOWARD, Massachusetts Institute of Technology — Developing accurate predictive transport models of burning plasma conditions is essential for confident prediction and optimization of next step experiments such as ITER and DEMO. Core transport in these plasmas is expected to be very small in gyroBohm-normalized units, such that the plasma should lie close to the critical gradients for onset of microturbulence instabilities. We present recent results investigating the scaling of linear critical gradients of ITG, TEM, and ETG modes as a function of parameters such as safety factor, magnetic shear, and collisionality for nominal conditions and geometry expected in ITER H-mode plasmas. A subset of these results is then compared against predictions from nonlinear gyrokinetic simulations, to quantify differences between linear and nonlinear thresholds. As part of this study, linear and nonlinear results from both GYRO [1] and CGYRO [2] codes will be compared against each other, as well as to predictions from the quasilinear TGLF [3] model. Challenges arising from near-marginal turbulence dynamics are addressed.

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[3] G. M. Staebler, J. E. Kinsey, and R. E. Waltz, Phys. Plasmas **14** 055909 (2007)

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