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Gyrokinetic Study of L-H Transition with Profile Evolution[1] HUA-SHENG XIE, Peking Univ, GTC TEAM — Recent simulations based on gyrokinetic toroidal code (GTC) and theory based on model eigen equation (H. S. Xie and Y. Xiao, arXiv:1503.04440) have found that the eigenstates of mirco-instabilities (trapped electron mode TEM or ion temperature gradient mode ITG) under strong and weak gradients are not the same. Under weak gradient, the most unstable mode is on the ground state, with conventional ballooning mode structure. When the gradient exceed a critical value, the most unstable mode jump to non-ground state. The mode structures of non-ground state are rich and unconventional, and thus can reduced the transport level, which can provide a explanation to the H-mode in the mirco-scale aspect. Nonlinear simulations (H. S. Xie, Y. Xiao and Z. Lin, 9th West Lake International Symposium on Plasma Simulation, May. 18-21, 2015, Hangzhou, China) verified this and have also found a turning point of the gradient. The turbulent transport coefficient would decrease with the gradient increasing when the gradient exceed a critical value. This provide a new route for the L to H transition without invoking shear flow or zonal flow. In the above works, the profiles are fixed. In this work, we will give some preliminary results on self-consistent simulations of L-H transition including the evolution of the radial plasma profiles.

[1]Collaboration with GTC team

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