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Magnetic island induced ITG instability in multi-scale MHD and micro-turbulence YASUAKI KISHIMOTO, JIQUAN LI, Z.X. WANG, J.Q. DONG, MIHO JANVIER, KENJI IMADERA, Kyoto University — Multi-scale fluctuations due to different drive force can coexist and interplay with each other in magnetic fusion plasmas such as in tokamak. The cross-scale interaction may provide new energy channels as a drive or sink. As a common and typical multi-scale problem, we have proposed a gyrofluid model to numerically simulate the evolution of mixed-scale electromagnetic (EM) turbulence involving resistive MHD and ion-scale micro-instability[1]. In this work, we investigate the stability of ion temperature gradient (ITG) in a plasma with the excitation of resistive tearing mode (RTM). Our gyrofluid simulations are performed for linear excitation and nonlinear evolution of both RTM and ITG instabilities in a slab geometry. It is observed that due to the nonlinear interaction between RTM and ITG modes, the mixed scale EM fluctuation is first saturated at a lower level. Afterwards, the magnetic island continuously grows with a slow time scale. It is interestingly found that a new fluctuation propagating along ion diamagnetic direction becomes growing when the magnetic island width approaches some size. It is identified as a new ITG instability induced by magnetic island, which is referred to as MITG. [1] Jiquan Li, Y. Kishimoto, et al. Nucl Fusion 49, in printing (2009). [2] Z X Wang, Jiquan Li, J.Q.Dong, Y.Kishimoto, Phys. Plasmas 16, 060703(2009)

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