

Global Gyrokinetic Turbulence Simulations of the Edge Pedestal

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The radially global electromagnetic gyrokinetic turbulence simulation GEM is used to investigate linear properties and nonlinear turbulence in the edge pedestal region. We restrict our investigation to closed flux surface regions inside the separatrix. We will also report our recent results on the pinch of cold ions from recycling in the pedestal region [1]. DIII-D L and H-mode edge pedestal profile profiles will be examined. In flux-tube simulations we have identified a kinetic ballooning mode (KBM) instability at the normalized radius $\rho_N=0.965$, which is close to the pedestal top. The critical β of this KBM is around 0.9%. In global simulations of the pedestal, however, the dominant instability seems to be a drift wave in the steep gradient region propagating along the electron diamagnetic direction. The effects of E_r , β and collisionality will be reported.

[1] “The pinch of cold ions from recycling in the tokamak edge pedestal,” W. Wan, S. Parker, Y. Chen, G. Park, C. Chang, D. Stotler, to appear in Phys. Plasmas (2011).