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H-mode pedestal turbulence in DIII-D and NSTX using BOUT++[1] X.Q. XU, LLNL, B.D. DUDSON, U. York, I. JOSEPH, LLNL, R.J. GROEBNER, GA, R. MAINGI, ORNL — In this work, we will report BOUT++ simulations for H-mode pedestal instabilities and turbulent transport. For DIII-D H-mode discharges, the BOUT++ peeling-ballooning ELM model including electron inertia was used to analyze the ideal linear stability and ELM dynamics. The beta scan is carried out from a series of self-consistent MHD equilibria generated from EFIT by varying pressure and/or current. For typical tokamak pedestal plasmas with high temperature and low collisionality, we found that the collisionless ballooning modes driven by electron inertia are unstable in the H-mode pedestal and have a lower beta threshold than ideal peeling-ballooning modes, which are the triggers for Edge Localized Modes. The growth rate of electron inertia ballooning modes is found to increase with the magnitude of the electron skin depth d_e=c/ω_{pe}. Thus, collisionless (electron inertia) ballooning modes might be responsible for H-mode turbulence transport when the pedestal is stable to peeling-ballooning modes. BOUT++ calculations also show that NSTX Elm stability boundaries are sensitive to flow shear profile. Attempts are underway to calculate nonlinear turbulence and transport in H-mode discharges due to the non-ideal effects.

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