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Gyrokinetic simulation of tokamak edge plasmas

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It has been recently discovered that the trapped electron mode (TEM) may play an important role in the H mode edge plasma for domestic tokamaks such as EAST and HL-2A. The stability and transport for TEM for the edge parameters are studied using large scale gyrokinetic particle simulations. The gyrokinetic simulation reveals the parametric dependences on the wavelength, collisionality and the electron temperature gradients. The un-conventional ballooning mode structure is found the H mode edge parameters, which directly leads to a change in the transport characteristics in the edge. The zonal flow is found by the gyrokinetic simulation to be less important in the edge than in the core. In order to interpret the simulation results, a simplified analytic theory is developed to include both collisional and strong gradient edge characteristics.

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