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Recent Progress in BOUT++ simulations[1] X.Q. XU, Lawrence Livermore Natl Lab, BOUT++ TEAM — BOUT++ has been applied for a range of problems, including edge-localized mode (ELM) simulations, flux-driven simulations of an edge transport barrier formation, pedestal MHD turbulence, and validating the magnitude and scaling of the divertor heat load width for C-Mod, DIII-D, NSTX, and EAST. BOUT++-PIC simulations supporting RF antenna design show impurity migration pattern from RF sputtering. The latest 3-field 2-fluid BOUT++ simulation results demonstrated the linear and nonlinear characteristics of ELMs at different collisionality & electric fields E_r shear via a density scan. The BOUT++ simulation results show an emerging understanding of dynamics of ELM crashes and the consistent collisionality scaling of ELM energy losses with the world multi-tokamak database. The impact of radial electric field E_r shear on low-n peeling and high-n ballooning modes is different. The increase E_r shear significantly enhances the linear growth rate of low-n peeling modes at low density, but only weakly impacts on nonlinear saturation amplitudes. In contrast, the increasing E_r shear leads to large suppression of nonlinear peeling-ballooning saturation amplitudes at high density, but only weakly impacts on their linear growth rates.

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