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Six-field two-fluid simulations on edge localized modes with BOUT++[1] TIANYANG XIA, ASIPP, LLNL, XUEQIAO XU, LLNL, BIN GUI, ASIPP, LLNL — We develop the six-field two-fluid model based on Braginskii equations to simulate peeling-ballooning (P-B) modes for evolution of edge ion density, ion temperature, electron temperature, parallel ion velocity, magnetic flux and vorticity in tokamak. The effects of energy flux, energy exchange and viscosity are included in our model. The flux-limited parallel thermal conductivity model is also used. Compared with previous three-field P-B model, for the same pressure profile, the density gradient length scale can increase the normalized linear growth rate by 6.2%. The growth rate can be reduced up to 33.6% by the parallel thermal conductivities, most of which are contributed by electrons. Therefore, the saturated electron temperature fluctuation amplitude is only around 1/4 of ions after ELM crashes, and the ELM size is decreased by more than 50.0%. The gyro-viscosity plays the role of stabilizing effects and decreases the growth rate by 16.0%. The sheath boundary conditions have been implemented to study the behaviors of particle and heat flux towards divertor plates. The nonlinear simulations on EAST geometry will be presented.

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