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Impact of Plasma Density/Collisionality on Divertor Heat Flux Width (PhD Oral-24)[1] NAMI LI, DLUT, X.Q. XU, LLNL, R.J. GOLDSTON, Princeton University, D.Z. WANG, J.Z. SUN, DLUT — The BOUT++ simulations with the attached divertor conditions for H-mode discharges well follow the Heuristic-Drift-based (HD) divertor heat flux width scaling of inverse dependence on the poloidal magnetic field in the drift dominant regime. However, both ASDEX-Upgrade data and the generalized HD (GHD) model showed that the scrape-off width broadens as the density/collisionality increases. A series of BOUT++ transport simulations are performed to study the physics of the scaling characteristics of the divertor heat flux width vs density/collisionality via a plasma density scan. The simulations show that even in the drift dominated regime, the divertor heat flux width can be broadened due to the transition of the SOL residence time from the parallel particle flow time to the enhanced parallel conduction time as the collisionality/density increases as posited in the GHD model. In addition, the heat flux width is found to be proportional to the square root of ion mass for low collisionality while it has a weakly dependence on ion mass for high collisionality. Furthermore, our simulations show that as the density increases, the radial electric field (Er) well shallows, which potentially weakens ErxB flow shear stabilization of turbulence at high density.

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