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**Prediction of divertor heat flux width for ITER Pre-Fusion Power Operation (PFPO) phase using BOUT++ transport and turbulence codes***[1] XIAOXUE HE, DUT, LLNL, XUEQIAO XU, LLNL, ZEYU LI, GA, BEN ZHU, LLNL, YUE LIU, DUT — Prediction of divertor heat flux width is performed for the PFPO-I and PFPO-II scenarios in the new ITER Research plan. Both fluid transport and turbulence codes under BOUT++ framework are used to capture the physics of PFPO-II phase on different temporal scales. Two-fluid turbulence code is used to study SOL turbulence dynamic and corresponding transport. Transport simulations are also performed for the PFPO-I phase as comparison. The initial plasma profiles inside the separatrix are taken from CORSICA scenario studies. Transport coefficients in transport code are calculated by inverting the plasma profiles inside the separatrix and are assumed to be constants in SOL. An anomalous thermal diffusivity scan is performed with E x B and magnetic drifts. The results in both scenarios identify two distinct regimes: a drift dominant regime when diffusivity is smaller than the respective critical diffusivity and a turbulence dominant regime when diffusivity is larger than it. The critical diffusivity is 0.5 $m^2/s$ in 5MA PFPO-I scenario and 0.3 $m^2/s$ in 7.5MA PFPO-II scenario. The ITPA multi-machine experimental scaling yields a lower limit of the width. By fixing q and $T_{sep}$, the critical diffusivity is $\chi_c \propto A^{1/2}/(Z(Z+1)^{1/2}Bp^2)$.

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