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Gyrokinetic simulation of edge blobs and divertor heat-load footprint[1] C.S. CHANG, S. KU, R. HAGER, M. CHURCHILL, PPPL, E. D'AZEVEDO, P. WORLEY, ORNL — Gyrokinetic study of divertor heat-load width Lq has been performed using the edge gyrokinetic code XGC1. Both neoclassical and electrostatic turbulence physics are self-consistently included in the simulation with fully nonlinear Fokker-Planck collision operation and neutral recycling. Gyrokinetic ions and drift kinetic electrons constitute the plasma in realistic magnetic separatrix geometry. The electron density fluctuations from nonlinear turbulence form blobs, as similarly seen in the experiments. DIII-D and NSTX geometries have been used to represent today's conventional and tight aspect ratio tokamaks. XGC1 shows that the ion neoclassical orbit dynamics dominates over the blob physics in setting Lq in the sample DIII-D and NSTX plasmas, re-discovering the experimentally observed 1/Ip type scaling. Magnitude of Lq is in the right ballpark, too, in comparison with experimental data. However, in an ITER standard plasma, XGC1 shows that the negligible neoclassical orbit excursion effect makes the blob dynamics to dominate Lq. Differently from Lq 1mm (when mapped back to outboard midplane) as was predicted by simple-minded extrapolation from the present-day data, XGC1 shows that Lq in ITER is about 1 cm that is somewhat smaller than the average blob size.

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