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UEDGE

Modeling of Snowflake and Standard Divertors in MAST-U Tokamak¹ ALEXANDER KHRABRY, VSEVOLOD SOUKHANOVSKII, THOMAS ROGN-LIEN, MAXIM UMANSKY, Lawrence Livermore Natl Lab, DAVID MOULTON, JAMES HARRISON, Culham Centre for Fusion Energy - In a snowflake (SF) divertor, two magnetic field nulls are placed close to each other creating four strike points (SPs) cf. two in a standard (ST) divertor. In preparation to MAST-U experiments, ST and SF divertor configurations with various relative locations of the nulls were modeled using a two-dimensional multi-fluid code UEDGE. A full plasma transport model with charge-state-resolved sputtered carbon impurities and enhanced transport (mixing) in the null region has been implemented in the code. Computational grids with high resolution of the two-null SF region have been created. The model has been verified by comparing to previous SOLPS/EIRENE solutions for ST divertor using transport coefficients for MAST tokamak. The modeling results show that: 1) heat and ion flux profiles at primary SPs are substantially broadened and peak values are reduced in SF configurations w.r.t. ST divertor; 2) secondary SPs receive up to 20% of heat and particle fluxes (w.r.t. the outer strike point); 3) SF divertors approach the outer and inner SP detachment conditions at lower upstream density w.r.t. ST divertor; 4) these effects become more prominent with the SF mixing increase.

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Alexander Khrabry Lawrence Livermore Natl Lab

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