Abstract Submitted
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UEDGE modeling of NSTX and NSTX-U snowflake divertor configurations[1] E.T. MEIER, V.A. SOUKHANOVSKII, A.G. MCLEAN, T.D. ROGNLIEN, D.D. RYUTOV, LLNL, R.E. BELL, A. DIALLO, S. GERHARDT, R. KAITA, B.P. LEBLANC, J.E. MENARD, M. PODESTA, F. SCOTTI, PPPL, AND NSTX RESEARCH TEAM — The 2D multi-fluid edge transport code UEDGE is applied to interpret NSTX snowflake divertor (SFD) experiments and to project SFD behavior in upcoming NSTX-U operation. The SFD reduces divertor target heat flux mainly by direct flux-expansion broadening of the heat flux profile and by volumetric losses due to increased connection length and larger divertor volume. Experimental SFD discharges in NSTX showed significant peak heat flux reduction as compared to standard divertor (STD) discharges ($q_{pk,SFD} \approx 1\text{MW/m}^2$ vs. $q_{pk,STD} \approx 7\text{MW/m}^2$). Core carbon impurity reduction of 30-70% was observed in the SFD experiments. UEDGE modeling gives insight into the physics that underlie these results. For heat flux reduction,the relative contributions of direct profile broadening and volumetric effects are examined. In connection with carbon impurity reduction, the roles of sputtering reduction and carbon transport modification are studied. Also presented are results from UEDGE modeling of high-power NSTX-U scenarios in which the SFD is expected to play a key role in keeping heat fluxes below material limits.

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