Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Modeling Divertor Plasma Characteristics for Snowflake Configurations in the DIII-D Tokamak[1] T.D. ROGNLIEN, B.I. COHEN, D.D. RYUTOV, M.V. UMANSKY, S.L. ALLEN, G.D. PORTER, V.A. SOUKHANOVSKII, LLNL — A snowflake divertor is formed when two magnetic X-points are brought in close proximity [1]. Such a configuration is expected to reduce peak divertor heat flux through E.G. magnetic flux expansion, increased volume for line radiation, and longer magnetic connection length. Reduced heat fluxes have been observed on TCV, NSTX, and DIII-D [2]. 2D UEDGE plasma/neutral transport simulations are performed to compare plasma profiles and fluxes near the DIII-D divertor plates for a single-X-point divertor and a snowflake divertor. Radial transport coefficients are fit to yield measured midplane profiles, with divertor profiles computed self-consistently. As observed experimentally [2], a substantial reduction in peak heat flux is found for the snowflake, with flux expansion being a key effect. The impact of plasma convection driven by large local plasma β_p near the magnetic null is modeled by β_p-dependent transport.

[1] D.D. Ryutov, Phys. Plasmas **14**, 064502 (2007).
[2] S.L. Allen, et al., 2012 IAEA Fusion Energy Conf., San Diego, CA, post deadline paper.

[1]Work supported by the US DOE under DE-AC52-07NA27344.

Tom Rognlien
Lawrence Livermore National Laboratory

Date submitted: 12 Jul 2013 Electronic form version 1.4