Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

SOLPS-DIVIMP modeling of the impact of divertor closure on tungsten erosion and transport in DIII-D[1] XINXING MA, ORAU, TYLER ABRAMS, BRENT COVELE, GA, DAVID ELDER, UTIAS, HOUYANG GUO, GA, PETER STANGEBY, UTIAS — Predictive modeling of the Small Angle Slot (SAS) divertor in DIII-D with toroidal tungsten rings in different poloidal locations is conducted to evaluate the impact of divertor closure on W impurity sourcing and transport. It is found that the closed slot structure of SAS results in denser and colder plasmas relative to the open lower divertor leading to lower sputtering rates, as well as stronger divertor screening associated with shorter ionization mean free paths and stronger friction force towards the target. Compared with the lower open divertor, the SAS divertor achieves 1 to 2 orders of magnitude smaller W erosion and leakage for similar upstream conditions. The enhanced redeposition and more favorable net force balance reduce both the effective W erosion and the divertor leakage from the slot bottom W source compared to the far-target W sources. With fixed upstream conditions, when the outer strike point (OSP) is placed on the slot bottom W ring, the W net erosion and leakage fraction decreases by an order of magnitude and over 60%, respectively, relative to the case with the OSP on the W ring at the outer baffle. These simulations utilize the DIVIMP code for W erosion, transport and deposition/redeposition, with background plasma solutions provided by the SOLPS code. The effect of drifts on W migration in the SOL region will also be reported.

[1]Work supported by US DOE under DE-FC02-04ER54698

Xinxing Ma
ORAU

Date submitted: 02 Jul 2019 Electronic form version 1.4