Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

OEDGE modeling of tokamak-induced material migration in NSTX and NSTX-U[1] J.H. NICHOLS, M.A. JAWORSKI, R. KAITA, T.W. ABRAMS, C.H. SKINNER, D.P. STOTLER, PPPL — As fusion reactors scale up in size, power, and duty cycle, the quantity of material eroded from the plasma-facing components (PFCs) will rise to levels far above those seen in prior experiments. Changes to PFC composition and topography due to global-scale material migration could have drastic effects on tokamak operation, especially in mixed-material machines such as NSTX-U and ITER. As a first step in understanding tokamak-induced material migration in a compact geometry, net erosion of carbon PFCs in NSTX is modeled using the OEDGE code suite (DIVIMP, EIRENE, and OSM) [P. Stangeby et al., J. Nucl. Mater. 313-316, 883 (2003)]. The sensitivity of erosion patterns to various core and divertor plasma parameters is examined. A realistic NSTX plasma background is then applied to the NSTX-U geometry in order to provide an estimate of net erosion patterns that will be seen in NSTX-U's all-carbon initial phase. These simulations are used as a guide for the optimal placement of erosion diagnostics (quartz crystal microbalances, witness samples, and marker tiles) for use in the NSTX-U startup campaign.

[1]Work supported by US DOE contract DE-AC02-09CH11466 and the DOE Fusion Energy Sciences Fellowship Program.

Jacob Nichols
Princeton Plasma Physics Laboratory

Date submitted: 10 Jul 2013 Electronic form version 1.4