

Abstract Submitted  
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**Tokamak Simulation Code (TSC) and Free-Boundary TRANSP Modeling of NSTX-U** C.E. KESSEL, F.M. POLI, PPPL, R. RAMAN, Univ. Wash., J.E. MENARD, PPPL — The National Spherical Torus Experiment Upgrade (NSTX-U) will increase the plasma current and toroidal field by a factor of 2, and the off-axis neutral beam (NB) will significantly expand the high performance operating space from the NSTX. The plasma current can reach 2.0 MA with access to 5 s flattops, while the toroidal field can produce 1.0 T at the plasma center for 6.5 s. The NB power will increase to 10 MW for 5 s, which is expected to provide up to 1.0 MJ plasma stored energies. The additional NB will have off-axis steering that enhances the current drive efficiency and absorbed to injected power. Multiple divertor coils will enable greater flexibility in shaping and controlling divertor heat loads. In order to begin extensive discharge scenario evaluations a model is built for TSC including the solenoid coils, poloidal field coils, and conducting structures. Coordination of these simulations with the newly developed free-boundary TRANSP capability will be presented. Time-dependent free-boundary simulations of standard H-mode, advanced high non-inductive current fraction, and non-solenoidal startup are examined. Work supported by the US Department of Energy under DE-AC02-CH0911466.

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