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Free-Boundary Modeling of NSTX Plasmas STEPHEN JARDIN, ROBERT ANDRE, JIN CHEN, STEFAN GERHARDT, CHRISTIANE LUDESCHER, DOUG MCCUNE, PPPL, ROYCE SAYER, C.S. Engineering — We have implemented a new capability within the SWIM framework to facilitate detailed free-boundary transport-timescale modeling of NSTX and other tokamaks and comparison with experimental data. The SWIM framework provides a convenient method to bring together state-of-the-art tokamak physics codes and code packages. In these simulations, we make use of the experimental coil currents in the free-boundary Tokamak Simulation Code (TSC) to simulate the discharge current ramp-up, flat-top, and in some cases, the rapid disruptive termination. The Monte Carlo neutral beam code NUBEAM is used to calculate neutral beam heating and current drive. A new option, using TRXPL, allows us to import the density and/or pressure profiles from a previous TRANSP run into the simulation and to use these instead of the predictive profiles computed by TSC. This provides a convenient way to effectively decouple the errors made in the prediction of these profiles from those made in the evolution of the current profile, while still using the bootstrap and NUBEAM current drive terms. Applications include a detailed benchmarking exercise between TSC and Free-Boundary-PTRANSP, and comparison of predicted disruption halo-currents with experimental measurements.

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