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Numerical Investigations of Instability-Induced Current Redistribution in a Spherical-Torus Plasma PETER NORGAARD, Princeton University, JONATHAN MENARD, ROSCOE WHITE, Princeton Plasma Physics Laboratory, YURIY YAKOVENKO, National Academy of Sciences of Ukraine, DOUGLAS MCCUNE, Princeton Plasma Physics Laboratory, CLARENCE ROWLEY, Princeton University — Recent experimental observations suggest that interchange-type instabilities may play an important role in redistribution of the neutral beam injected current in the National Spherical Torus Experiment (NSTX). In our present work, the guiding center orbits of various test particles are integrated in the presence of a prescribed magnetic perturbation using a modified version of the ORBIT code. The perturbation modes are derived from NSTX diagnostic data during periods where instability-induced redistribution is observed experimentally. These results show the possibility of enhanced transport for certain regions of phase space. Simulations are also presented which show the time evolution of the neutral beam injected ion distribution, where the initial profile is obtained using a newly developed component for NUBEAM, part of the TRANSP software package. Ultimately, we hope to develop a self-consistent model for instability-induced current redistribution, including possible self-regulation between the fast-ion current and the core MHD instabilities.

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