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Equilibrium Reconstructions with V3FIT and Current Evolution Modeling for 3-D Stellarator Plasmas J.C. SCHMITT, Auburn University, M. CIANCIOSA, Oak Ridge National Laboratory, J. GEIGER, Max Planck Institute for Plasma Physics, S. LAZERSON, Princeton Plasma Physics Laboratory — V3FIT is a powerful equilibrium reconstruction tool for magnetic confinement fusion experiments which are inherently 3-D in nature (i.e. stellarators) or have 3-D components (tokamaks with 3-D shaping, reversed field pinches with helical states, etc). Here, we present details of the diagnostic modeling, constraints and the user interface for reconstructions of W7-X plasmas. For typical discharges during the OP1.1 run campaign of W7-X, the net toroidal current and current density profile do not reach steady-state. When modeling the current evolution in 3-D plasmas, both poloidal and toroidal currents are linked with both poloidal and toroidal fluxes. In contrast, in toroidally axisymmetric plasmas, the poloidal flux is linked only with the toroidal current and the toroidal current is linked only with the poloidal flux. Compared to an equivalently-sized axisymmetric configuration, the current diffusion in 3-D plasmas is enhanced, leading to a faster relaxation of the current profile to its steady-state. Implications for the time-evolution of the current and rotational transform profiles in stellarator plasmas are discussed. This work is supported by DoE grant DE-SC00014529.

John Schmitt
Auburn University

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