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Modeling the Time Evolution of QSH Equilibria in MST Plasmas Using V3FIT J. BOGUSKI, M. NORNBERG, S. MUNARETTO, B.E. CHAPMAN, University of Wisconsin, M. CIANCIOSA, Oak Ridge Natinoal Lab, P.W. TERRY, University of Wisconsin, J. HANSON, Auburn University — High current and low density RFP plasmas tend towards a 3D configuration, called Quasi-Single Helicity (QSH), characterized by a dominant core helical mode. V3FIT utilizes multiple internal and edge diagnostics to reconstruct the non-axisymmetric magnetic equilibrium of the QSH state. Performing multiple reconstructions at different stages in the QSH cycle is used to learn about the time dynamics of the QSH state. Recent work on modeling a shear-suppression mechanism for QSH formation has produced a predator-prey model of the time dynamics that reproduces the observed behavior, in particular the increased persistence of the QSH state with increased plasma current. Either magnetic or flow shear can facilitate QSH formation. The magnetic shear dependence of QSH is analyzed using V3FIT reconstructions of magnetic equilibrium constrained by internal measurements of density and temperature as well as soft x-ray emission. Fluctuations in the flux surface structure are compared against the measured temperature and density fluctuations and the reconstructed temperature and density profiles are examined to look for evidence of barriers to particle and heat transport. This material is based upon work supported by the U.S. DOE.

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