Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

ECCD-induced tearing mode stabilization in coupled IPS/NIMROD/GENRAY HPC simulations THOMAS JENKINS, S.E. KRUGER, Tech-X, E.D. HELD, Utah State, R.W. HARVEY, CompX, W.R. ELWASIF, ORNL, D.D. SCHNACK, UW-Madison, SWIM PROJECT TEAM — We present developments toward an integrated, predictive model for determining optimal ECCD-based NTM stabilization strategies in ITER. We demonstrate the capability of the SWIM Project's Integrated Plasma Simulator (IPS) framework to choreograph multiple executions of, and data exchanges between, physics codes modeling various spatiotemporal scales of this coupled RF/MHD problem on several thousand HPC processors. As NIMROD evolves fluid equations to model bulk plasma behavior, self-consistent propagation/deposition of RF power in the ensuing plasma profiles is calculated by GENRAY. A third code (QLCALC) then interfaces with computational geometry packages to construct the RF-induced quasilinear diffusion tensor from NIMROD/GENRAY data, and the moments of this tensor (entering as additional terms in NIMROD's fluid equations due to the disparity in RF/MHD spatiotemporal scales) influence the dynamics of current, momentum, and energy evolution. Initial results are shown to correctly capture the physics of magnetic island stabilization [Jenkins *et al.*, PoP **17** 012502 (2010)]; we also discuss the development of a numerical plasma control system for active feedback stabilization of tearing modes. Funded by USDoE SciDAC.

Thomas G. Jenkins
Tech-X

Date submitted: 27 Jul 2011 Electronic form version 1.4