Abstract Submitted
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ECCD-induced tearing mode stabilization via active control in coupled NIMROD/GENRAY HPC simulations[1] THOMAS JENKINS, S.E. KRUGER, Tech-X Corporation, E.D. HELD, Utah State, R.W. HARVEY, CompX, SWIM PROJECT TEAM — Actively controlled electron cyclotron current drive (ECCD) applied within magnetic islands formed by neoclassical tearing modes (NTMs) has been shown to control or suppress these modes. In conjunction with ongoing experimental efforts, the development and verification of integrated numerical models of this mode stabilization process is of paramount importance in determining optimal NTM stabilization strategies for ITER. In the advanced model developed by the SWIM Project, the equations/closures of extended (not reduced) MHD contain new terms arising from 3D (not toroidal or bounce-averaged) RF-induced quasilinear diffusion. The quasilinear operator formulation models the equilibration of driven current within the island using the same extended MHD dynamics which govern the physics of island formation, yielding a more accurate and self-consistent picture of 3D island response to RF drive. Results of computations which model ECRF deposition using ray tracing, assemble the 3D quasilinear operator from ray/profile data, and calculate the resultant forces within the extended MHD code will be presented. We also discuss the efficacy of various numerical active feedback control systems, which gather data from synthetic diagnostics to dynamically trigger and spatially align RF fields.

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