Abstract Submitted
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MHD Simulation of RF Current Drive in MST[1] J.A. GOETZ, E.R. HENDRIES, J.K. ANDERSON, C.B. FOREST, J.A. REUSCH, A.H. SELTZMAN, C.R. SOVINEC, University of Wisconsin - Madison, S. DIEM, Oak Ridge National Laboratory, R.W. HARVEY, CompX — Auxiliary current drive using the electron Bernstein wave (EBW) may advance the performance of the RFP. In prior computations, a hypothetical edge-localized current is shown to suppress tearing activity that governs transport in the RFP. Ideal conditions for tearing stabilization include reduced toroidal induction, and precise width and radial position of the current drive. To support MST EBW studies, an integrated modeling scheme incorporates ray tracing and Fokker-Plank predictions of auxiliary current into single fluid MHD. Simulations at low Lundquist number ($S \approx 10^4$) agree with the previous work but at MST-like S ($S \approx 3\text{x}10^6$) show unexpected results. The effect on the current profile by the rf-driven force decreases in magnitude and widens considerably as S increases. Simulations reproduce the experimentally observed periodic current profile relaxation events (sawteeth). With rf drive, reduction of tearing mode amplitudes is seen, but is limited to periods between each sawtooth, which persist with up to 10 MW of rf. Prolonged low tearing amplitudes are predicted with the combination of current drive and reduced toroidal loop voltage, consistent with previous conclusions. Finally, these simulations show that the resistivity profile has a strong effect on the optimal current drive profile for mode stabilization.

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