Abstract Submitted
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Benchmarking extended MHD modeling of resonant magnetic perturbations against measurements of islands and screening on DIII-D[1] M.W. SHAFER, J.M. CANIK, S.P. HIRSHMAN, ORNL, T.E. EVANS, N.M. FERRARO, GA — Experiments where resonant magnetic perturbations (RMPs) are applied to L-mode plasmas are used to test the fundamental plasma response physics on island formation in resistive MHD models. Fine torque scans reveal that large RMP-induced n=1 islands open at multiple mode-rational surfaces (m=2,3,4) at low rotation, but are screened elsewhere. Time-independent linear resistive MHD simulations with the M3D-C1 code predict a narrow region centered at at $\omega_{e\perp} < 0$ where resonant fields are found to be weakly screened, though strongly screened elsewhere. Experimentally, the island formation window is wider and centered at $\omega_{e\perp} < 0$. Nonlinear resistive MHD simulations in the absence of rotation are performed with the SIESTA code. A series of meta-stable equilibria are modeled with an increasing helical 2/1 perturbation. These meta-stable equilibria demonstrate the transition from even-parity screening currents at the rational surface at low perturbation levels to odd-pairty Pfirsch-Schlüter currents when a large island is present.

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