Abstract Submitted
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Nonlinear island dynamics in the presence of sheared toroidal flow[1] C.C. HEGNA, University of Wisconsin — Recent experimental observations indicate a sensitivity of neoclassical tearing mode threshold physics and saturated island widths to the plasma rotation properties. An analytic theory for nonlinear magnetic island physics in toroidal plasmas is developed that allows for equilibrium toroidal flows. Specifically, equations governing the helical equilibrium state in the vicinity of an isolated magnetic island are developed using an asymptotic theory based on a small island approximation. The island profiles are determined to within three functions of the helical magnetic flux that are subsequently determined by transport properties in the island region. The presence of sheared toroidal flow alter island polarization currents, helical Pfirsh-Schlüter currents produced by pressure and curvature and the Mercier indices needed for the asymptotic matching. The effect of sheared rotation on the external ideal MHD matching data (Δ') will also be addressed.

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C. C. Hegna
University of Wisconsin

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