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Modeling of Divertor Plates in the Compact Toroidal Hybrid[1]
G.J. HARTWELL, C.M. SMALL, D.A. ENNIS, J.D. HANSON, S.F. KNOWLTON, D.A. MAURER, Auburn University — In long pulse length stellarator experiments, edge island divertors can be used as a method of plasma particle and heat exhaust. Knowledge of the detailed power loading on these structures and its relationship to the long connection length scrape off layer physics is a new Compact Toroidal Hybrid research thrust. We report the results of connection length studies for divertor plates to be installed in the Compact Toroidal Hybrid (CTH), a five field period torsatron with $R_0 = 0.75\,\mathrm{m}$, $a_p \sim 0.2\,\mathrm{m}$, and $\mathrm{B} \leq 0.7\,\mathrm{T}$. For these studies, CTH will be operated as a pure stellarator with no ohmically generated plasma current. The CTH edge rotational transform can be varied from ι_{vac}(a)=0.02–0.35 by adjusting the ratio of currents in the helical and toroidal field coils. A poloidal field coil is used to adjust the shear of the rotational transform profile, and hence the size of edge islands, while the phase of the island is rotated with a set of five error coils producing an n=1 perturbation. For the studies conducted, a magnetic configuration with a large n=1, m=3 magnetic island at the edge is generated. Results from multiple possible divertor plate locations relative to the island structure will be presented.

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Gregory Hartwell
Auburn Univ

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