Abstract Submitted
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Overview, Progress, and Plans for the Compact Toroidal Hybrid Experiment[1] G.J. HARTWELL, N.R. ALLEN, D.A ENNIS, J.D. HANSON, E.C. HOWELL, C.A JOHNSON, S.F. KNOWLTON, J.D. KRING, X. MA, D.A. MAURER, K.G. ROSS, J.C. SCHMITT, P.J. TRAVERSO, E.N. WILLIAMSON, Auburn University — The Compact Toroidal Hybrid (CTH) is an $\ell = 2, m = 5$ torsatron/tokamak hybrid ($R_0 = 0.75\,\mathrm{m}$, $a_p \sim 0.2\,\mathrm{m}$, and $|B| \leq 0.7\,\mathrm{T}$) which generates highly configurable confining magnetic fields solely with external coils but typically uses up to 80 kA of plasma current for heating and disruption studies. The main goals of the CTH experiment are to study disruptive behavior as a function of applied 3D magnetic shaping, and to test and advance the V3FIT reconstruction code and NIMROD modeling of CTH. The disruptive density limit is observed to exceed the Greenwald limit as the vacuum transform is increased with no observed threshold for avoidance. Low-q operations ($1.1 < q(a) < 2.0$) are routine, with disruptions ceasing if the vacuum transform is raised above 0.07. Sawteeth are observed in CTH and have a similar phenomenology to tokamak sawteeth despite employing a 3D confining field. Application of vacuum transform has been demonstrated to reduce and eliminate the vertical drift of elongated discharges. Internal SXR diagnostics, in conjunction with external magnetics, extend the range of reconstruction accuracy into the plasma core

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