Abstract Submitted
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Disruptions and disruption avoidance in the CTH torsatron/tokamak experiment[1] S.F. KNOWLTON, G.J. HARTWELL, J.D. HANSON, J.L. HERFINDAL, M.C. MILLER, B.A. STEVENSON, Auburn University — It has long been known that disruptions are rare in current-carrying toroidal plasmas if the discharge is performed within a stellarator equilibrium with a modest vacuum rotational transform of $\iota \leq 0.14$ [1]. Experiments are performed in the current-carrying Compact Toroidal Hybrid (CTH) torsatron/tokamak ($R = 0.75$ m, $a \sim 0.2$ m, $B \leq 0.7$ T, $I_p \leq 65$ kA, $n_e \leq 10^{19}$ m^{-3}) to better understand the conditions for passive disruption. As in previous experiments, we find that disruptions characterized by a rapid current quench do not occur if the applied vacuum rotational transform $\iota_{VAC}(a)$ exceeds a value of $\sim$0.15 even though stable plasmas with q_{edge} of 1.6 are obtained. Below this threshold transform, disruptions can be triggered by ramping the plasma density to levels comparable to the Greenwald density limit. These and other disruptions also arise from a vertical instability in which the plasma channel drifts upward. The vertical instability is reduced or eliminated with (1) sufficient external transform, or (2) reduction of the vertical elongation using a pair of quadrupole shaping coils.

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