Abstract Submitted
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Characteristics of Low-q(a) Disruptions in the Compact Toroidal Hybrid[1] M.D. PANDYA, M.C. ARCHMILLER, D.A. ENNIS, G.J. HARTWELL, D.A. MAURER, Auburn University — Tokamak disruptions are dramatic events that lead to a sudden loss of plasma confinement. Disruptions that occur at low edge safety-factor, $q(a)$, limit the operation of tokamaks to $q(a) \geq 2$. The Compact Toroidal Hybrid (CTH) is a torsatron-tokamak hybrid with a helical field coil and vertical field coils to establish a stellartor equilibrium, while an ohmic coil induces plasma current. A feature of the CTH device is the ability to adjust the vacuum rotational transform, ι_{vac} ($\iota = \frac{1}{q}$), by varying the ratio of current in the helical and toroidal field coils. The value of edge ι_{vac} can be varied from about 0.02 to 0.3 ($q_{vac}(a) \sim 50$ to 3.3). Plasma discharges in CTH are routinely observed to operate with $q(a) < 2$, and in some cases as low as $q(a) \sim 1.1$. In CTH, low-q(a) disruptions are observed with a dominant m/n=3/2 precursor. The disruptivity of plasma discharges is over 80% when $\iota_{vac}(a) < 0.04$ ($q_{vac}(a) < 25$) and as $\iota_{vac}(a)$ is increased further, the disruptivity of the plasma discharges decreases. The disruptions are completely suppressed for $\iota_{vac}(a) > 0.07$ ($q_{vac}(a) \sim 14$).

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