Abstract Submitted
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3D Equilibrium Reconstruction with Improved Magnetic Diagnostics on the Compact Toroidal Hybrid[1] XINXING MA, JAMES D. HANSON, GREGORY J. HARTWELL, STEPHEN F. KNOWLTON, DAVID A. MAURER, Auburn Universtiy — Equilibrium reconstructions using the three-dimensional V3FIT code [1] have been performed for low density (low β) current carrying plasmas on the Compact Toroidal Hybrid (CTH), a torsatron in which the magnetic configuration can be strongly modified by an ohmically-driven plasma current. These reconstructions use 50 external magnetic diagnostic measurements, including segmented and full Rogowski coils, saddle loops, poloidal and radial magnetic pickup coils. Time dependent 3D reconstructions document the evolution of the plasma cross section and current profile, with calculated value of β_θ much less than the plasma internal inductance, l_i. Reconstructions typically show the plasma to move outward in major radius and become less elongated in poloidal cross section with increasing plasma current. In plasmas with low vacuum transform ($\iota_{vac} \approx 0.04$), the plasma current profile peaks with l_i above 0.84 when the total transform is 1/2, which typically leads disruption. With values of $\iota_{vac} \geq 0.1$, l_i remains low (≈ 0.7), and the discharges no longer disrupt.

[1] J. D. Hanson et al., Nucl. Fusion **49**, 075031 (2009)

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