Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

V3FIT Reconstructions using Soft X-Ray and Interferometric Diagnostics on the Compact Toroidal Hybrid

G.J. HARTWELL, M. CIANCIOSA, J.D. HANSON, M.C. ARCHMILLER, J. HERFINDAL, S.F. KNOWLTON, X. MA, D.A. MAURER, Auburn University — Reconstruction of three-dimensional (3D) equilibrium is important for improving the operation and understanding the physics of non-axisymmetric magnetic confinement devices. We present V3FIT[1] 3D reconstruction results from the Compact Toroidal Hybrid (CTH) experiment ($R_0 = 0.75\text{ m}, a_p \approx 0.2\text{ m}, B \leq 0.7\text{ T}, n_e \leq 5 \times 10^{19}\text{ m}^{-3}, T_e \leq 300\text{ eV}, I_p \leq 80\text{ kA}$) where we have used internal diagnostic signals as inputs to the V3FIT code. The two diagnostics, a three-channel, 1 mm interferometer, and a 54-channel Soft X-ray (SXR) array, are chordal type measurements that generate signals based on the line-integrated values of the plasma density and/or temperature sampled from the interior of the plasma. We use two parameterization models for the electron density and SXR emissivity profiles: a two-power fit model capable of producing flat to centrally peaked profiles, and a line-segment model that can produce hollow profiles. Results show that SXR diagnostics are sensitive to plasma elongations caused by plasma current profile changes not detected by magnetic diagnostics.


This work is supported by the USDoE under grant DE-FG02-00ER54610.

Gregory Hartwell
Auburn University

Date submitted: 10 Jul 2013

Electronic form version 1.4