Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Analysis and measurement of the 3D magnetic field in a rotating magnetic field driven FRC K.M. VELAS, R.D. MILROY, University of Washington — A translatable three-axis probe was installed on TCSU shortly before its shutdown. The probe has 90 windings that simultaneously measure B_r, B_θ, and B_z at 30 radial positions. Positioning the probe at multiple axial positions and taking multiple repeatable shots allows for a full r-z map of the magnetic field. Probe measurements are used to calculate the end-shorting torque and the rotating magnetic field (RMF) torque. The torque applied to the plasma is the RMF torque reduced by the shorting torque. An estimate of the plasma resistivity is made based on the steady state balance between the applied torque and the resistive torque. The steady state data from applying a 10 kHz low pass filter used in conjunction with data at the RMF frequency yields a map of the full 3D rotating field structure. Data from even- and odd-parity experiments will be presented. The NIMROD code has been adapted to simulate the TCSU experiment using boundary conditions adjusted to match both even- and odd-parity experimental conditions. A comparison of the n=0 components of the calculated fields to the 3-axis probe measurements shows agreement in the magnetic field structure of the FRC as well as in the jet region.

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Date submitted: 19 Jul 2012 Electronic form version 1.4