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Equilibrium Reconstruction Techniques Applied to Compact Toroid Plasmas in MRX S.P. GERHARDT, M. YAMADA, H. JI, PPPL, M. INOMOTO, Osaka University — We have developed a code for the solution of the Grad-Shafranov equation, constrained by available measurements, for compact toroid plasmas in MRX. While these methods have been commonplace in tokamak research and have been applied for RFP and spheromak plasmas as well, this represents a new application of the techniques to Field Reversed Configuration (FRC) plasmas. We model the vacuum vessel as a perfect flux-conserver when calculating Green's tables, which are subsequently used for fast calculations of the magnetic field in MRX. The code consists of two loops: an outer loop where the profiles and other free parameters are varied, and an inner loop where the Grad-Shafranov equation is solved by simple iteration. Data used to constrain the equilibrium include arrays of internal magnetic probes, plasma current Rogowski coils, and limited pressure information from Langmuir probes and Doppler Spectroscopy. The calculations illustrate that a significant variety of plasma shapes are available in MRX through control of the equilibrium field curvature. In particular, the external field index can be controlled, leading to different rigid-body stability regimes in MRX. This work is funded by the Department of Energy.

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