Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Properties of the FRX-L Field Reversed Configuration (FRC) inferred from density profile measurements assuming MHD equilibrium
EDWARD L. RUDEN, Air Force Research Laboratory, Directed Energy Directorate, SHOUYIN ZHANG, THOMAS P. INTRATOR, GLEN A. WURDEN, RICHARD RENNEKE, Los Alamos National Laboratory — A laser interferometer probes the line integrated time history of plasma density along eight chords of the FRX-L high-density ($\sim 10^{17}$ cm^{-3}) FRC. The data is Abel and tomographically inverted to provide density profiles. The FRC is roughly in an axisymmetric rotational MHD equilibrium for a 3 μs interval between the initial implosion that produces the FRC and an $n = 2$ rotational instability that terminates confinement. $B_z(r, t)$ may then be inferred, given an external magnetic field measurement. The period during which its area integral approximates an independent axial flux measurement self-consistently identifies the equilibrium interval. Basic FRC properties such as temperature, poloidal flux, and α (rotational to ion diamagnetic drift frequency ratio) are then inferred. Results indicate that poloidal flux estimates based on magnetic and axial flux measurements alone are conservative, and that the critical α for $n = 2$ instability (estimated two ways) is roughly between 0.5 and 1.0.

Edward L. Ruden
Air Force Research Laboratory, Directed Energy Directorate

Date submitted: 20 Jul 2006 Electronic form version 1.4