Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Studies of Equilibrium and Stability of Oblate FRCs in the Magnetic Reconnection Experiment STEFAN GERHARDT, Princeton Plasma Physics Labratory (PPPL), M. INOMOTO, Osaka University, E. BELOVA, M. YAMADA, H. JI, Y. REN, S. DORFMAN, PPPL, E. MARTIN, North Carolina State University — The equilibrium and stability of oblate FRCs have been studied in MRX using a comprehensive array of >200 magnetic pick-up coils. FRC plasmas are formed by the counter-helicity merging of two spheromaks; control of the plasma stability is provided by a flexible external field magnet set and (sometimes) passive conductors. The deadly external tilt can be mitigated by i) the introduction of a passive stabilizer (a conducting center column), or ii) the formation of extremely oblate FRCs. The radial shift mode is stabilized by the passive stabilizer, or saturates before the termination of the configuration without the center conductor. Even with passive stabilizers, ballooning-like co-interchange modes (with toroidal mode number n>=2) often terminate the plasma. Formation of extremely oblate plasmas leads to the minimum amplitude of co-interchange modes and the longest plasma lifetime. The improved linear and non-linear stability of highly oblate FRCs was verified with the HYM code. An ohmic solenoid system has been constructed for the study of FRC sustainment, aiming to provide up to 50mWb of magnetic flux at 50kA of solenoid current. A plasma biasing system has been constructed to drive controlled rotation, allowing an assessment of how rotation impacts the FRC stability.

Stefan Gerhardt
Princeton Plasma Physics Labratory (PPPL)

Date submitted: 19 Jul 2006 Electronic form version 1.4