Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

FRC rotation control using an electric field EDWARD RUDEN, Air Force Research Laboratory, MICHAEL FRESE, NumerEx — A Field Reversed Configuration (FRC) spontaneously gains angular momentum about its z-axis over time until an instability with azimuthal mode number $n = 2$ develops. This is potentially a limiting factor for particle confinement in FRC's. Ions diffusing beyond the separatrix having a preferred angular momentum is one cause of rotation. The boundary conditions where the open magnetic field lines outside the separatrix exit the vacuum chamber resulting in a viscous torque being applied to the FRC at the separatrix is another. Controlling the axial electric field via equipotential conducting rings at a fused quartz tube's inner surface where the open field lines exit the vacuum to prevent rotation is considered. Torque on the FRC due to otherwise passive boundary conditions there may thereby be avoided, and spin-up due to particle diffusion countered. A steady state analysis of FRC rotation due to the boundary potential distribution of a perfectly conducting extended MHD plasma obeying generalized Ohm's law, in addition to numerical simulations of the process are presented.

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Date submitted: 19 Jul 2007 Electronic form version 1.4