Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Helicity-injected current drive and open flux instabilities in spherical tokamaks[1] D.P. BRENNAN, University of Tulsa, P.K. BROWNING, University of Manchester, J. GATES, University of Tulsa, R.A.M. VAN DER LINDEN, Royal Observatory of Belgium — The toroidal current driven by instabilities and relaxation processes in a cylindrical Spherical Tokamak (ST) geometry with coaxial injected flux is estimated by use of the linear ideal stability boundary of equilibria with a high current on the open driven flux and a lower current on the closed flux. Previous results for spheromaks (1D and 2D) and STs (1D) have predicted stabilization if the closed flux plasma current is sufficiently large, suggesting that the current drive mechanism is self-limiting. For 2D ST equilibria new features appear in the stability maps as the axial length and toroidal field strength are varied. These include changes in the shape of stability boundaries, and resonance effects which extend stability boundaries into the stable region. The results provide driven current estimates with varying geometric length ratio R/L and imposed toroidal field strength; these results have implications both for existing spherical tokamaks, and the design of future devices.

[1]Supported in part by US DOE Grant DE-FG02-07ER54931

Dylan Brennan
University of Tulsa

Date submitted: 09 Jan 2009 Electronic form version 1.4