Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Measurement of Plasma Flow using High-Speed Imaging[1] M. KLASSEN, A. HATZIKYRIAKOU, B.A. GRIERSON, M.E. MAUEL, Columbia University — When a magnetized plasma is convected by low-frequency fluctuations, the plasma $\mathbf{E} \times \mathbf{B}$ flow can be characterized by a stream function, equal to the electrostatic potential when the flow is expressed in flux coordinates. Under certain circumstances, the equation of particle number continuity, relating cross-field structure and flow to the stream function, can be solved computationally for the potential. We have demonstrated this using a model problem with static boundary conditions. In this poster we report applying this technique to plasma dynamics measured by a high-speed camera or by simultaneous multi-point polar current measurements. The fast camera is mounted to a porthole of Columbia University's Collisionless Terrella Experiment (CTX), which features a dipole plasma believed to be two-dimensional. We seek to image the plasma at a frame rate high enough to distinguish moving structures, determine the stream function, and calculate the magnitude and spatial structure of the plasma potential. We will also investigate the correlation between the fast camera diagnostic and other diagnostics.

[1]This work is supported by U.S. DOE Grant DE-FG02-00ER54585

Mikhail Klassen
Columbia University

Date submitted: 18 Jul 2008 Electronic form version 1.4