Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Sub-Alfvenic Reduced Equations for Tokamak Plasmas[1] W. SENGUPTA, A.B. HASSAM, T.M. ANTONSEN, University of Maryland College Park — We present a system of reduced resistive MHD equations which are sub-Alfvenic with respect to ideal ballooning in large aspect ratio tokamak geometry.The low beta system allows dynamic evolution of full profiles. The system has the advantage that it is 2-dimensional in the transverse to **B**, space variables. This allows significant analytical tractability as well as ease in numerical implementation. The linearized equations are shown to reproduce Mercier modes, resistive ballooning modes, tearing modes, sound waves, GAMs, the Stringer spinup, and Rosenbluth-Hinton zonal flows. The methodology developed allows extension to drift modes as well as to a hybrid system of moment and electromagnetic sub-gyro-drift-kinetic equations. Analytical and numerical benchmarks will be presented. We show that the system, which requires Laplace equation inversion to solve for electromagnetic potentials, is implementable numerically.

[1]Work supported by DOE

Wrick Sengupta
University of Maryland College Park

Date submitted: 23 Jul 2015 Electronic form version 1.4