Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

A Low Moment Kinetic MHD Simulation Model[1] SCOTT PARKER, JIANHUA CHENG, Univ. of Colorado — A wide variety of low-frequency macroscopic plasma phenomena are well described assuming quasi-neutrality, neglecting the displacement current and obtaining the electric field with a generalized Ohm's law. With this in mind, one can formulate the kinetic problem using ion density and ion flow moments. Kinetic electron physics enters via the electron pressure term in the generalized Ohm's law. Here, we formulate and test such a model with kinetic ions and an equation of state for the electrons. Whistler waves, shear Alfven waves (with finite gyro-radius corrections) and ion acoustic waves are present in the homogeneous plasma problem. Simulation results with this model are compared to the linear dispersion relation, including ion Landau damping. This simple kinetic particle model based on evaluating lower moments identically models the physics of more sophisticated extended-MHD models where ion kinetics closes via higher moments.

[1]Work supported by the SciDAC Center for Extended Magnetohydrodynamics.

Scott Parker
Univ. of Colorado

Date submitted: 21 Jul 2007 Electronic form version 1.4