Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Gyrokinetic δf particle simulation of energetic particles driven modes JIANYING LANG[1], YANG CHEN, SCOTT PARKER, University of Colorado at Boulder, GUO-YONG FU, Princeton Plasma Physics Laboratory — We reduce the global GEM code [1] from a fully kinetic model with gyrokinetic ions and drift kinetic electrons to a hybrid model with gyrokinetic ions and massless fluid electrons to study the Toroidicity-Induced Alfven Eigenmodes (TAEs) at finite plasma pressure. For benchmark purpose, this hybrid model is further reduced to a two fluid model. Using a low-n global TAE as a test case, we observed the existence of a global discrete eigenmode in the two fluid simulation. The observed mode frequency is within the gap and close to the lower continuum which agrees well with the expected TAE frequency. This simulation result shows very good agreement with an eigenmode analysis based on the two fluid model. In the presence of the gyrokinetic hot ions, this TAE is driven unstable with the growth rate scaling linearly with the hot ion pressure β_{hot}. Turning on the gyrokinetic bulk ions, we observed the kinetic Alfven mode structure and the growth rate of the unstable TAE being reduced, which is expected because of the kinetic damping effect. We are currently comparing the damping rate obtained from the gyrokinetic simulations to theoretical calculation. [1] Y. Chen and S. Parker, J. of Comp. Phys. 220, 839 (2007).

[1]Current address: Princeton Plasma Physics Laboratory

Jianying Lang
University of Colorado at Boulder

Date submitted: 09 Jan 2009 Electronic form version 1.4