Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Impact of velocity space distribution on hybrid kinetic MHD simulation of the $(1,1)$ **internal kink mode** CHARLSON C. KIM, University of Washington - PSI Center, NIMROD TEAM — Simulation studies of the impact of the velocity space distribution on the stabilization of $(1,1)$ internal kink mode and excitation of the fishbone mode were performed with a hybrid kinetic MHD model. The simulations were performed by extending the physics capabilities of **NIMROD**(Non-Ideal MHD with Rotation - Open Discussion)–a three dimensional extended magnetohydrodynamic (MHD) code– to include kinetic effects of an energetic minority ion species. These kinetic effects are included by computing a pressure moment tensor using δf particle-in-cell (PIC) method. The marker particles are advanced in the self consistent NIMROD fields. We outline the implementation and present simulation results of energetic minority ion stabilization of the $(1,1)$ internal kink mode and excitation of the fishbone mode. A benchmark of the linear growth rate and real frequency are shown to agree well with M3D. We examine the impact of the details of the velocity space distribution such as extending the velocity space cut off and the impact of passing versus trapped particles and show that they strongly impact the stabilization and excitation of the $(1,1)$ mode.

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Date submitted: 31 Jul 2007 Electronic form version 1.4