Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

3-D Electromagnetic Instabilities in Current Sheet ZHENYU WANG, YU LIN, XUEYI WANG, Department of Physics, Auburn University, LIU CHEN, Department of Physics and Astronomy, UC Irvine and IFTS Zhejiang Univ, KURT TUMMEL, Lawrence Livermore National Lab — 3-D electromagnetic instabilities in a Harris current sheet with a finite guide magnetic field B_G are systematically studied by employing the gyrokinetic electron and fully kinetic ion (GeFi) particle model with a realistic mass ratio m_i/m_e. Our studies show that lower-hybrid drift instability (LHDI) with $k\sqrt{\rho_i\rho_e} \sim 1$ and drift kink instability (DKI) and drift sausage instability (DSI) with $k\rho_i \sim 1$ are excited in the current sheet. The most unstable DKI is away from $\mathbf{k}\cdot\mathbf{B} = \mathbf{0}$, and the most unstable DSI is at $\mathbf{k}\cdot\mathbf{B} = \mathbf{0}$, where $\mathbf{k} \equiv (\mathbf{k_x}, \mathbf{k_y})$, with k_x being along the anti-parallel field direction and k_y is along the current direction. On the other hand, an instability with a compressional magnetic field perturbation located at the center of current sheet is also excited under a relatively large B_G, and its maximum growth rate is at $\mathbf{k}\times\mathbf{B} = \mathbf{0}$. The presence and structure of these instabilities as a function of B_G is presented. The GeFi simulation results are compared with those from the fully kinetic particle simulation.

Zhenyu Wang
Department of Physics, Auburn University

Date submitted: 15 Jul 2016 Electronic form version 1.4