Abstract Submitted
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Influence of Current Aligned Instabilities on Magnetic Reconnection in Neutral Sheet Geometry W. DAUGHTON, V. ROYTERSHTEYN, L. YIN, B.J. ALBRIGHT, K.J. BOWERS, LANL, H. KARIMABADI, UCSD — The influence of current aligned instabilities on collisionless reconnection is studied within neutral sheet geometry using petascale 3D kinetic simulations, which permit ion to electron mass ratios in the range $m_i/m_e = 200-400$. Open boundary conditions are employed to avoid artificial recirculation effects and better mimic large-scale systems in nature. During the onset and initial evolution, intense lower-hybrid drift activity is observed immediately upstream of the electron diffusion region and along the separatrices, with characteristic wavelength on the electron gyroscale $k_y\rho_e \sim 1$. These fluctuations do not penetrate into the central electron layer, and are gradually weakened as the upstream density gradients relax and a highly elongated electron-scale current layer is formed. At later times, an electromagnetic instability is observed within the elongated electron layer with wavelength $k_y(\rho_i\rho_e)^{1/2} \sim 1$ roughly consistent with previous predictions from Vlasov theory[1]. This instability gives rise to a pronounced kinking or undulation of the electron layer in a manner qualitatively similar to large-scale electron-positron plasmas[2]. The possible influence of these instabilities on the dissipation rate and energy partition is discussed.

[1]Daughton, Phys. Plasmas, **10**, 3103, 2003
[2]Yin et al, PRL **101**, 125001, 2008

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