Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Drift and suppression of x-lines in asymmetric magnetic reconnection YI-HSIN LIU, MICHAEL HESSE, NASA/GSFC, WILLIAM DAUGHTON, LANL, PAUL CASSAK, WVU — The x-line of reconnection drifts in the outflow direction when the current sheet is asymmetric and has a guide field. In particular, reconnection can be choked off if the x-line drifts too fast. The energy conversion from the magnetic field to particles is hence significantly reduced. A suppression was suggested when the relative diamagnetic drift speed between electrons and ions exceeds the Alfvén speed based on the reconnecting magnetic field.[1] In this work, we re-visit this problem using Particle-in-Cell simulations. We break down the pressure gradient to a combination of density and temperature gradients, and find that the suppression effect from the temperature gradient is much weaker compared to that with a density gradient, consistent with a recent work using gyrokinetic simulations.[2] In addition, a wide range of parameters are explored to benchmark the theory, and the flux-breaking mechanism in these drifting x-lines is analyzed. This work has potential application at Earth's magnetopause and in Tokamak devices.[3]

[1]M. Swisdak et al., J. Geophys. Res., **108**, 1218, 2003
[2]S. Kobayahsi et al., Phys. Plasmas, **21**, 04074, 2014
[3]M. T. Beidler and P. Cassak, Phys. Rev. Let., **107**, 255002, 2011

Yi-Hsin Liu
NASA/GSFC

Date submitted: 24 Jul 2015 Electronic form version 1.4