Abstract Submitted
for the MAS15 Meeting of
The American Physical Society

Asymmetric magnetic reconnection with flow shear: PIC simulations and magnetopause applications PAUL CASSAK, CHRISTOPHER DOSS, West Virginia University — Magnetic reconnection at Earths dayside magnetopause typically has significant asymmetries in both magnetic field strength and plasma density. In addition, a flow shear across the reconnection site in the plane of the reconnecting magnetic field can be caused by magnetosheath flow, especially at higher latitudes. Predicting the solar winds effect on reconnection is important for understanding, e.g., solar wind-magnetospheric coupling. Recently, we showed that flow shear during asymmetric reconnection causes the reconnection site to convect in the outflow direction, predicted the flow speed from momentum conservation, and confirmed the results with two-dimensional two-fluid numerical simulations. We also predicted and confirmed with two-fluid simulations the reconnection rate as a function of upstream plasma conditions and the flow shear required to shut reconnection off. Here, we revisit this using two-dimensional particle-in-cell (PIC) simulations, which treat plasma mixing in the exhaust more realistically than the fluid model. We find good agreement between the predictions and PIC simulation results for both the X-line convection speed and the reconnection rate for flow speeds below the cutoff speed. Applications to the dayside magnetopause will be discussed.

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Date submitted: 25 Sep 2015 Electronic form version 1.4