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Quasi-separatrix layer diagnostics and electron force balance in line-tied systems ZACHARY BILLEY, ELLEN ZWEIBEL, University of Wisconsin, Madison, JOHN FINN, WILLIAM DAUGHTON, Los Alamos National Laboratory — Magnetic reconnection plays a key role in processes such as coronal mass ejections, solar/stellar dynamics, planetary magnetospheres and accretion disk flares. Magnetic reconnection may be influenced by the line-tied boundary conditions in these systems. For example, magnetic field lines that enter and exit a stellar surface are fixed to the surface at the timescales which coronal magnetic reconnection events take place. In some systems, temperatures may be high enough and densities low enough that collisionless effects play the dominant role. Motivated by this, we investigate collisionless magnetic reconnection in line tied geometry with a series of fully kinetic particle-in-cell simulations of varying lengths. To understand the reconnection physics, we employ field line integrated reconnection diagnostics[1] to examine the formation of quasi-separatrix layers[2] and their association with the integrated parallel electric field. In addition, we examine the electron force balance along field lines to identify the nature of non-ideal behavior in the reconnection region and its connection to magnetic topology.

[1]Finn et. al., *Plasma Physics and Controlled Fusion* **56**, 064013, 2014
[2]E. R. Priest and P. Demoulin,*J Geophys Res*, 100:23443, 1995

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