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Quasi-Separatrix Layers and Line-tied Reconnection in Collisionless Plasmas[1] ZACHARY BILLEY, ELLEN ZWEIBEL, University of Wisconsin - Madison, JOHN FINN, WILLIAM DAUGHTON, LANL — Many plasmas undergoing magnetic reconnection have boundaries that have constant magnetic flux on the dynamical timescales of the system, such as coronal loops and planetary magnetospheres. Systems where the boundary magnetic flux is constant are called line-tied systems. We conduct collisionless fully 3D particle-in-cell simulations in slab geometry to study how line-tying changes the dynamics relative non-tied systems. We confirm Quasi-Separatrix Layers (QSLs)[2] as a model for predicting potential reconnection sites in 3D systems. Based on this theory, we use line-integrated diagnostics to investigate the collisionless physics relating to the parallel electric field. Here we find non-gyrotopic terms in the pressure tensor are important at the center of the reconnection layer. We investigate the effect of varying the length of the line-tied plasma on the growth rate and reconnection process and compare oblique modes with equivalent periodic systems. We discuss the extension into collisionless regimes of the geometric width vs tearing width theory,[3] developed to explain line-tied suppression of tearing in MHD reconnection.

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[2]Titov V. S. *et. al.* Geophys. Res. **107** 1164 (2002)
[3]Y. M. Huang and E. G. Zweibel Phys. Plasmas **16** 042102 (2009)

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