Abstract Submitted
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Evolution of diffusion region structures in collisionless magnetic reconnection[1] LI-JEN CHEN, NAOKI BESSHO, JASON SHUSTER, GUANLAI LI, University of New Hampshire, WILLIAM DAUGHTON, LANL, ROY TORBERT, University of New Hampshire — Using a combination of measurements from space and particle-in-cell simulations, we investigate the evolution of diffusion region structures in collisionless magnetic reconnection with weak to zero guide fields. Ion outflow jets develop and reach the Alfven speed before any significant anisotropy in the electron velocity space can be discerned. The Hall fields and the inversion electric field vary significantly with phases of reconnection, and are modified as secondary magnetic islands emerge from the electron diffusion region. Highly structured electron anisotropies develop in distinct magnetic regions after the reconnection rate reaches its maximum, providing a way to delineate sub-domains of the ion diffusion region. The evolution of the electron diffusion region is strongly affected under a guide field even just a few percent of the reconnecting field. Quantitative knowledge on the evolution of the diffusion region is critical to interpreting the comparisons between space measurements, laboratory experiments, and simulations of reconnection.

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