Physics of 2-1/2D Driven Collisionless Magnetic Reconnection

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The physical picture of how electrons and ions flow, how the electric and magnetic fields change, and how particles gain energy will be presented for the 2-1/2D collisionless driven magnetic reconnection. The 2-1/2 dimensional collisionless reconnection studies are performed using the particle simulation PASMO code [1] and theoretical analysis. In particular, we will provide the physical mechanism of how the poloidal current (including the Hall current in the downstream region) is generated and how the electrostatic potential is produced in the poloidal plane. The physical picture of how the quadrupole magnetic field and electrostatic potential are generated in the 2-dimensional (poloidal) plane is different from the one presented by Uzdensky and Kulsrud [2].

[1] H. Ohtani and R. Horiuchi, *Plasma Fusion Res.* **4**, 024 (2009)
[2] D. A. Uzdensky and R. M. Kulsrud, *Phys. Plasma* **13**, 062305 (2006)