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Quantifying the Reconnection Rate in Magnetopause Boundary Layers WILLIAM DAUGHTON, TAKUMA NAKAMURA, LANL, VADIM ROYTERSHTEYN, HOMA KARIMABADI, SciberQuest, BURLEN LORING, LBL — Solar wind entry into the magnetosphere occurs in thin boundary layers, which typically have large magnetic and/or velocity shear across them. Magnetic reconnection is the dominant entry mechanism, but in regions with strong nearly perpendicular velocity shear, the Kelvin-Helmholtz instability dominates and can lead to vortex induced reconnection. In both of these limits, recent fully kinetic simulations feature the development of 3D turbulence, characterized by electron-scale current sheets and interacting flux ropes. In the presence of this complex 3D dynamics, computing the reconnection rate by integrating the parallel electric field is problematic due to the chaotic magnetic field lines and large electric field fluctuations. Here we explore a new idea that exploits the connection between the magnetic topology and the mixing of electrons that originate from separate sides of the current layer. The 3D reconnection rate and local signatures of reconnection are contrasted with 2D in the limits of both weak and strong velocity shear.

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