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Enhanced Electron Heating and Mixing in a 3D Kinetic Simulation for MMS Magnetopause Crossings with Weak Guide Fields ARI LE, WILLIAM DAUGHTON, LANL, LI-JEN CHEN, U. MD - College Park, JAN EGEDAL, U. WI - Madison — We present a 3D kinetic simulation of asymmetric reconnection with plasma parameters matching the MMS magetopause diffusion region crossing reported by Burch et al. (Science 2016). The simulation was performed with the code VPIC on LANL's Trinity machine, which enabled relatively high grid resolution and numerical particle numbers to resolve the electron diffusion region dynamics. The simulation not only reproduces the reported crescent distributions but also appears to account for new features observed by MMS in other diffusion region events with weak guide fields. Compared to a 2D simulation with the same plasma parameters, drift turbulence in the 3D simulation substantially enhances the mixing and parallel heating of electrons on the magnetosphere side. This modifies the reconnection rate inferred from a recently introduced electron mixing diagnostic. To the magnetosphere side of the in-plane magnetic null, the parallel electric field exhibits a bipolar structure with polarities opposite to the large-scale parallel electric field. The 3D structure of the X line and the particle signature of the inverted bipolar parallel electric field have been observed by MMS.

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