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Drift Kinetic Measurements of Plasma Gradients in MMS Data¹ BLAKE WETHERTON, JAN EGEDAL, University of Wisconsin- Madison, PE-TER MONTAG, Massachusetts Institute of Technology, ARI LE, WILLIAM DAUGHTON, Los Alamos National Laboratory, BENOIT LAVRAUD, Université de Toulouse and Centre National de la Recherche Scientifique — In magnetic reconnection, magnetic stress energy is converted into particle energy through the topological rearrangement of magnetic field lines allowed by the breakdown of ideal MHD on small spatial scales. While many models exist to explain reconnection, the crucial physics lies in a thin current layer $\sim 1 d_e$ wide. NASA's Magnetospheric Multiscale (MMS) mission seeks to directly investigate magnetic reconnection in Earth's magnetosphere with a tetrahedral formation of four spacecraft. While gradients in plasma properties can be estimated through spacecraft positions, the spacing between each tends to be ~ 10 d_e , causing gradients at the crucial scale to be poorly resolved. We present a drift-kinetic method for obtaining gradients in the plasma distribution function with data from a single spacecraft. This model is derived from drift kinetics, verified with a VPIC fully-kinetic simulation, and applied to MMS data to infer the geometry of the reconnection region and demonstrate gradientscale resolution superior to finite difference methods between the four spacecraft.

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