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Electron and DC electric field signatures near a magnetotail reconnection region: Comparison between Cluster observations and PIC simulations N. BESSHO, L.-J. CHEN, P. PUHL-QUINN, A. BHATTACHARJEE, University of New Hampshire, USA, B. LEFEBVRE, Imperial College, UK, E. GEORGESCU, Max-Planck Institute, Garching, Germany, A. VAIVADS, Swedish Institute for Physics, Sweden — A collisionless magnetic reconnection event, which occurred in the magnetotail during a substorm, is studied based on data from the Cluster spacecraft and the results from a 2D PIC simulation. The focus is on the structure of DC electric fields and electron distribution functions within an ion inertial length of the reconnection site, including the electron diffusion region. The simulation shows the formation of an electrostatic potential well, with the electric field peaking near the separatrices and the thin current sheet. The existence of such an electrostatic potential well has been previously reported by J. R. Wygant and coworkers [J. Geophys. Res., 110, doi: 10.1029/2004JA010708, 2005]. Electric field structures (80 mV/m, peak ot peak) of the order of a few electron inertial lengths are observed by multiple spacecraft at times separated by a few minutes, indicating the persistence of the structure. Observed electron distribution functions exhibit very similar features as those obtained from the simulations. The comparison between observations and simulations enables us to see the extent to which 2D PIC simulations capture observed collisionless reconnection signatures, and to locate the spacecraft relative to the reconnection site.

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