



The observation of electron density cavity during a guide field magnetic reconnection

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A magnetic field reconnection event with a guide field observed by Cluster in the near-earth magnetotail is explored. In the magnetic reconnection event, the guide field is about 28% of the lobe magnetic field. The quadrupolar structure of the Hall magnetic field is very clear but distorted in the normal direction of the current sheet. Nonetheless, the maximum absolute values of the Hall magnetic field in the four quadrants are still equal. Two electron density cavities along the upper left and lower right separatrices are identified. In the lower left quadrant, no density cavity is found during its crossing by Cluster. The electron temperature drops sharply and the energetic electron fluxes increase when the spacecraft enters into the cavity. In both electron cavities, parallel electric fields are detected. The parallel electric field points away from the X-line. These observations suggest that the electron cavities are the electron accelerators during the guide field magnetic reconnection. The electrons display the beam distribution within the cavities.