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MMS Electric Field Observations of Electron-Scale Magnetic Holes in the Earth's Bursty Bulk Flow Braking Region

Katherine Goodrich (1), Robert Ergun (1), Frederick Wilder (1), Andrew Sturner (1), Justin Holmes (1), Julia Stawarz (1), Roy Torbert (2), Per-Arne Lindqvist (3), Yuri Khotyaintsev (4), Jim Burch (5), Robert Strangeway (6), Magnes Werner (7), Olivier Le Contel (8), Barbara Giles (9), and Daniel Gershman (9)

(1) Laboratory of Atmospheric and Space Physics, University of Colorado at Boulder, Boulder, USA, (2) University of New Hampshire, Durham, New Hampshire, USA, (3) KTH Royal Institute of Technology, Stockholm, Sweden, (4) Institutet för rymdfysik (IRF), Uppsala, Sweden, (5) Southwest Research Institute, San Antonio, Texas, (6) UCLA, Los Angeles, USA, (7) Austrian Academy of Sciences, Vienna, Austria, (8) Laboratoire de Physique des Plasmas, Paris, France, (9) Goddard Space Flight Center, Greenbelt, Maryland, USA

Electron-scale magnetic holes have been observed multiple times in the Earth's magnetosphere, particularly in the near-earth (6 RE to 12 RE) plasma sheet, or Bursty Bulk Flow (BBF) Braking region. This particular subset of magnetic holes has observed scale sizes perpendicular to the magnetic field (B) less than the environment's ion gyroradius. Previous observations from the THEMIS mission indicate that this subset of magnetic holes have negative potential in the center, which creates a diverging (outward) electric field at the boundary. The region of diverging electric field can drive an electron current via the ExB drift of electrons. Ions do not participate in the ExB drift due to the small scale size of the electric field. The Magnetospheric Multi-scale (MMS) spacecraft, launched March 2015, are currently orbiting the Earth with the objective of observing the microphysics of magnetic reconnection. During its commissioning phase (March - August 2015), all four spacecraft apogees were primarily in the BBF Braking region. MMS offers multi-spacecraft observations of electron-scale magnetic holes, which can possibly offer better insight to their structure and evolution.