

In situ observations of magnetic reconnection in plasma turbulence

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Abstract

We present, for the first time, both fluid-scale and kinetic-scale in-situ signatures of an ongoing reconnection in turbulent plasma. The spacecraft are crossing the reconnection inflow and outflow regions and the ion diffusion region (IDR). Inside the reconnection outflows D-shape ion distributions are observed. Inside the IDR mixing of ion populations, crescent-like velocity distributions and ion accelerations are observed. One of the spacecraft skims the outer region of the electron diffusion region (EDR), where parallel electric fields, energy dissipation/conversion, electron pressure tensor agyrotropy, electron temperature anisotropy and electron accelerations are observed. Some of the difficulties of the observations of magnetic reconnection in turbulent plasma are also outlined.