



The role of upper hybrid wave playing in magnetotail reconnection electron diffusion region

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Abstract:

We analyze one electron diffusion region (EDR) event in the magnetotail on 11 July 2017 observed by Magnetosphere Multiscale (MMS) mission. Intense upper hybrid (UH) waves and double layers were observed in EDR by MMS spacecraft for the first time as far as we know. The agyrotropic crescent-shaped electron distributions could result in the observed UH waves. Accompanying with the observations of UH waves, the adiabatic parameter κ^2 and the agyrotropy parameter \sqrt{Q} of the electrons decrease, implying that the UH waves could effectively scatter the electrons in the EDR. The good accordance of positive dissipation ($\mathbf{J} \cdot \mathbf{E}' > 0$) and the observed UH waves indicates that UH waves may contribute to the energy conversion from the field to the plasmas during magnetic reconnection.

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Figure 1

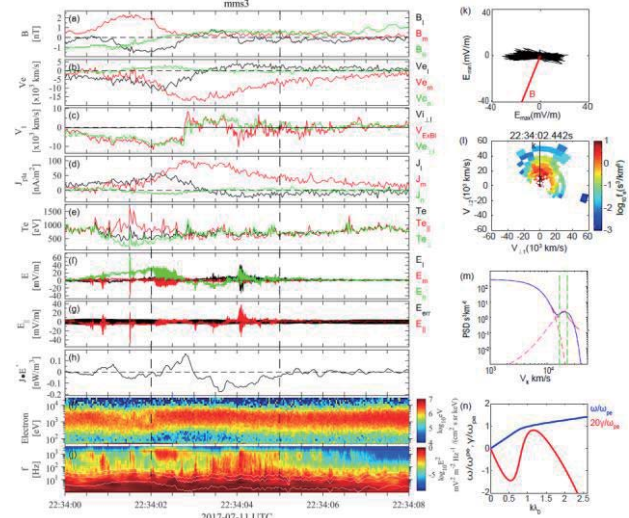


Figure1: Overview of properties of plasma in EDR and UH waves.

Figure 2

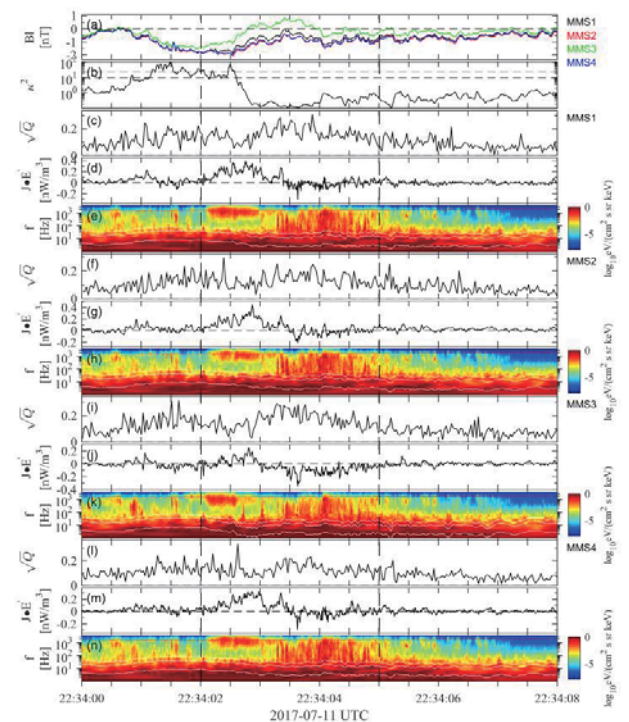


Figure 2. The relationship between UH wave vs energy dissipation and electron agyrotropy.