R006-35
Zoom meeting B ：11/2 PM1 (13:45-15:30)
14:00〜14:15

Measurements of nongyrotropic electrons around the cyclotron resonance velocity in whistler-mode waves

#Naritoshi Kitamura[1)],Takanobu Amano[2)],Yoshiharu Omura[3)],Scott Boardsen[4,5)],Daniel J. Gershman[4)],Masahiro Kitahara[7)], Satoko Nakamura[8)],Masafumi Shoji[7)],Yoshizumi Miyoshi[7)],Yuto Katoh[9)],Hirotsugu Kojima[10)],Yoshifumi Saito[11)], Masafumi Hirahara[12)],Shoichiro Yokota[13)],Barbara L. Giles[6)],William R. Paterson[4)],Craig J. Pollock[14)],Olivier Le Contel[15)], Christopher Russell[16)],Robert J. Strangeway[17)],Narges Ahmadi[18)],Per-Arne Lindqvist[19)],Robert E. Ergun[18)]

([1]The University of Tokyo,[2]The University of Tokyo,[3]RISH, Kyoto Univ.,[4]NASA/GSFC,[5]Partnership for Heliophys. and Space Env. Res., Univ. of Maryland in Baltimore County,[6]NASA/GSFC,[7]ISEE, Nagoya Univ.,[8]ISEE, Nagoya Univ.,[9]Dept. Geophys., Grad. Sch. Sci., Tohoku Univ.,[10]RISH, Kyoto Univ.,[11]ISAS,[12]ISEE, Nagoya Univ.,[13]Osaka Univ.,[14]Denali Scientific,[15]LPP, CNRS,[16]Dept. of Earth, Planet. Space Sci., UCLA,[17]Dept. of Earth, Planet. Space Sci., UCLA,[18]LASP, Univ. of Colorado, Boulder,[19]Royal Institute of Technology, Sweden,[20]SWRI

The interaction between the electromagnetic field and charged particles is central for the collisionless plasma dynamics in space. Whistler-mode waves are one of the electromagnetic plasma waves, which play important roles in efficient pitch-angle scattering and acceleration of electrons in solar wind, collisionless shock waves as well as planetary magnetospheres. The nonlinear wave-particle interaction theory for coherent large amplitude waves predicts that electrons around resonance velocities exhibit nongyrotropy due to the trapping motion around them and the nongyrotropic electrons exchange energy and momentum with the waves in the presence of an appropriate inhomogeneity. In this presentation, we show observational results of nongyrotropic electrons around the cyclotron resonance velocity using the data obtained by the Magnetospheric Multiscale (MMS) spacecraft during a whistler-mode wave (about 200 Hz) event around the magnetosheath-side separatrix of the dayside magnetopause reconnection. On the basis of measurements by the Fast Plasma Investigation Dual Electron Spectrometer (FPI-DES) and the search-coil magnetometer (SCM), the relative phase angle of the electron hole to the magnetic field of the whistler-mode wave agrees well with the prediction by the nonlinear theory, and this type of the electrons appeared only around the cyclotron resonance velocity. The electron flux at the hole was about 40% lower than that at the peak in the most pronounced case. This result provides evidence of locally ongoing nonlinear wave-particle interaction between the electrons and whistler-mode waves, and proves that the nonlinear wave growth occurs around the dayside reconnection.