Excitation of whistler-mode waves in the electron scale open boundary layer generated by the dayside magnetopause reconnection

*Hirotoshi Uchino[1], Satoshi Kurita[2], Yuki Harada[3], Shinobu Machida[2]

1.Solar-Planetary Electromagnetism Laboratory,Department of Geophysics,Faculty of Science,Kyoto University, 2.Institute for Space-Earth Environmental Research, Nagoya University, 3.Space Sciences Laboratory, University of California, Berkeley

The magnetic reconnection at the dayside magnetopause is generally because upstream physical quantities between magnetosheath and magnetosphere are quite different. Kinetic simulations of asymmetric magnetic reconnection produce an electron outflow layer mainly composed of magnetosheath electrons at the magnetosphere side of the separatrix. The simulation results suggest that this electron outflow layer corresponds to the reconnected open magnetic field closest to the magnetosphere. Based on the simulation result and data from the THEMIS probes, we show an observation of whistler mode waves in the electron outflow layer caused by asymmetric magnetic reconnection at the magnetopause. The waves propagated toward the reconnection region, and the linear growth rate of the wave was positive at the resonant velocity due to the electron temperature anisotropy. We suggest that the anisotropy can be originated from lack of the magnetospheric electrons moving anti-reconnection direction at small pitch angles since the magnetic field as a channel of the electrons connects to the magnetosheath region by the reconnection. This study quantitatively clarifies the excitation of the whistler-mode waves in the electron scale open boundary layer at the magnetopause in association with the dayside magnetopause reconnection.

Keywords: Dayside magnetopause magnetic reconnection, electron scale open boundary, Whister mode wave

