

## The role of ionospheric Hall effects on the energy balance in the M-I coupled system: - Does the auroral electrojet dissipate?

# Akimasa Yoshikawa[1], Ryouichi Fujii[2]

[1] Dept of Earth and Planetary Sci., Kyushu Univ, [2] STEL, Nagoya Univ

The role of ionospheric Hall effect on the energy balance in the magnetosphere-ionosphere coupling system through the field-aligned current is discussed. By dividing the net energy balance of total current system into the divergent and rotational current systems, we clear up the role of ionospheric Hall effect in the energy balance between dissipation and poynting flux of wave fields. Obtained results are follows, 1.the divergent current system works on the rotational current system and the rotational current system is worked by the rotational Hall current 2.net works between these systems are cancelled out each other.  $J_{HALL} * E = 0$  fairly means a ( $J_{HALL} * E$  in the rotational system +  $J_{HALL} * E$  in the divergent system = 0).

The role of ionospheric Hall effect on the energy balance in the magnetosphere-ionosphere coupling system through the field-aligned current is discussed. It is well known that the ionospheric Hall current can not be joule dissipated ( $J_{HALL} * E = 0$ ). However, it is also true that the ionospheric Hall current generates a poynting flux of poloidal type magnetic field to the magnetosphere and atmosphere. From a viewpoint of energy conservation law, there seem some ambiguities above two contexts.

By dividing the net energy balance of total current system into the divergent and rotational current systems, we clear up the role of ionospheric Hall effect in the energy balance between dissipation and poynting flux of wave fields. Obtained results are follows, 1.the divergent current system works on the rotational current system and the rotational current system is worked by the rotational Hall current 2.net works between these systems are cancelled out each other.  $J_{HALL} * E = 0$  fairly means a ( $J_{HALL} * E$  in the rotational system +  $J_{HALL} * E$  in the divergent system = 0). The energy balance in the auroral electrojet current system will be discussed in grater detail.