

## Electromagnetically coupled system between non-uniformly and anisotropically conducting inner earth and upper atmosphere

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Electromagnetically coupled system between upper atmosphere and inner earth, is discussed. It is well known that upper atmosphere and inner earth system is electromagnetically coupled across very small conducting atmospheric region, which means 'primary' induced electric field produced by the mutual coupling is almost inductive (divergence free). However if the conductivity distribution is inhomogeneous, 'secondary' polarization (curl-free) electric field can be produced at the region of conductivity gradient. In the ionosphere, non-uniform Hall conductivity distribution induces the Hall polarization field, which becomes cause of current concentration and potential deformation by the Cowling effect. Formation of Cowling channel is one of the most important and peculiar nature of weakly ionized system under strongly background magnetic field distribution.

In this presentation, we will introduce basic feature of electrodynamics at the non-uniform and anisotropically conducting ionosphere, and will discuss a possible electromagnetic coupling mechanism when the telluric conductivity distribution is non-uniform and anisotropic.

Keywords: ionospheric current, telluric current, electromagnetically coupled system