

## On the Harang-discontinuity type ionospheric potential deformation derived from the multi-functional potential solver

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A multi-functional ionospheric electric potential solver, which implements (1) the inverse Walen-separation method extracting the electromotive (emf) field from the MHD fields, (2) the Alfvénic M-I-coupling algorithm preserving the energy and current continuity between ionosphere and magnetosphere, and (3) the Hall conjugate current analysis method separating the Hall polarization field from the ionospheric electric field, is developed. Using this potential solver, we analyze the global ionospheric potential structure established by a symmetric Region-1 type field aligned current along with a magnetospheric twin-vortex convection field. It is found that the Hall polarization field generated at the conductivity edge of the auroral oval region skews the dawnside and duskside convection cells so that around the midnight region a structure similar to the Harang-discontinuity is formed. Our model does not include any asymmetric source of electric field in the magnetosphere such as the generation of the Region-2 type field-aligned current by particle drifts. Therefore, any dawn-dusk asymmetry created can be attributed exclusively to the M-I coupling. Thus, our finding should be very important for understanding the active role of the ionosphere in the M-I system. In this talk, we will make a detailed discussion on the deformation effect of the ionospheric potential field by the Hall polarization field.

**Keywords:** Harang discontinuity, Hall current divergence, field-aligned current, magnetosphere-ionosphere coupling, ionospheric potential