

## Generalization of Ionospheric polarization and Magnetospheric Field-Resonance

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Generalized wave equations for the three-dimensional magnetosphere-ionosphere coupling are derived. This formulation unifies two types of mode conversion between shear Alfvén wave and compressional wave, that is, one by the inhomogeneity of the Alfvén velocity in the magnetosphere and the other by the multi-step inductive Hall effect in the ionosphere. Wave generation by the magnetospheric dynamo in the source region of the magnetosphere and by the polarization effect in the loading region of the ionosphere can also be described by the same equation. The resultant horizontal propagation of ionospheric electrostatic potential field accompanied by the formation process of Birkeland current system could be explained by this formulation.

In this talk, we will discuss the formation process of Birkeland current system from viewpoint of the three-dimensional magnetosphere-ionosphere coupling.