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B 会場 ： 11/26　PM2（14:50-16:20）
15:05〜15:20:00

準定常磁気圏対流における定常性の維持, 空間電荷分布, エネルギー輸送

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Stationarity, space charge distribution, and energy transfer in the quasi-steady magnetospheric convection electric field

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The dawn-dusk electric field on the dayside is known to persist in the magnetosphere when the interplanetary magnetic field (IMF) is southward. Two fundamental questions arise regarding the queasy-steady convection electric field. First, is the quasi-steady dawn-dusk convection electric field in the magnetosphere caused by space charge that deposits in the magnetosphere? Secondly, how is the quasi-steady electric field sustained? Using the basis of global MHD simulations, we obtained the following results and inferences. (1) Near the equatorial plane, positive space charge dominates the duskside magnetosphere, while the negative space charge dominates the dawnside magnetosphere. (2) Space charge accumulation in the magnetosphere alone cannot account for the dawn-dusk electric field. Instead, plasma motion plays a primary role in generating the dawn-dusk electric field as previously suggested. (3) Steady convection electric field can be established when plasma flow remains steady. Even under such steady conditions, magnetic energy is continuously transferred from the solar wind to the polar ionosphere, as manifested by integral curves of the Poynting flux vector. This unidirectional energy flow is associated with the convective plasma motion that produces the steady dawn-dusk electric field. (4) The magnetosphere basically maintains equilibrium through a balance of unidirectional energy flow from the solar wind to the ionosphere. (5) When the equilibrium is partially disrupted (for example, in the near-Earth tail region during the substorm growth phase), the electric field becomes inductive. For the large-scale convection electric field, whether the electric field is electrostatic or inductive depends on the state of equilibrium.