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ポスター 1：11/25　AM1/AM2（9:15-12:35）

北向き IMF における太陽風磁気圏系での磁力線トポロジーとプラズマの相互作用 (2)

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Interaction between topology and plasma dynamics of the solar wind-magnetosphere system in the northward IMF conditions (2)

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Fujita et al. [2025] discussed the quasi-steady magnetic field structure of the solar wind-magnetosphere system under northward IMF conditions. Their discussion was framed from the perspective of the interaction between magnetic topology and plasma dynamics. In addition, they demonstrated that the vacuum magnetic field, which is produced by the superposition of the Earth's dipole field and the IMF, preserves the fundamental topological form of the solar wind-magnetosphere system. This topology provides the fundamental magnetic field structure necessary for magnetic reconnection between the IMF and the Earth's magnetic field. They further pointed out that the vacuum magnetic field represents the ground state of the system. Based on this finding, they argued that the quasi-steady magnetic field structure is determined by the balance between two forces: the deformation force exerted by plasma and the restoring force that tends to return the field to its ground state. Furthermore, the magnetic reconnection process is inherently built into this magnetic structure. From this viewpoint, the process of magnetic reconnection is naturally incorporated into the overall description.

We apply the above theory to a detailed poster discussion of the magnetic field structure and plasma distribution in the solar wind-magnetosphere system under northward IMF conditions. The topics we will address include:

(1) the relationship between the magnetic field structure and plasma distribution in the tail, and the resulting plasma flow;

(2) the contribution of topology to the generation of plasma sheets and the flow path of the electromagnetic energy carried by them;

(3) the current distribution leading to a magnetic field structure deformed from the vacuum magnetic field.

References

Fujita, et al. (2025), Fundamental physical processes of the steady solar wind-magnetosphere system in the northward IMF condition, submitted to EPS.