DEVELOPMENT OF AN EUV DATA ASSIMILATION TECHNIQUE FOR PLASMASPHERE MODELING

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The structure of the plasmasphere is strongly controlled by the electric field imposed on the magnetosphere. In order to model the dynamics of the plasmasphere, it is important to know the spatial structure of the electric potential in the inner magnetosphere. However, since it is difficult to know the global electric potential distribution in the magnetosphere due to the lack of observation, it is difficult to grasp the dynamics of the plasmasphere using in-situ measurements.
Recently we have developed a data assimilation technique which incorporates a remote observation of energetic neutral atoms (ENAs) from the IMAGE satellite into a ring current model. This ENA data assimilation technique provides estimates of the distributions of the ring current ions and electric potential in the inner magnetosphere. The present study is conducted aiming at applying a similar approach for modeling the plasmasphere. We are now engaged in the development of a data assimilation technique for providing estimates of the spatial structures of the plasmasphere and electric potential. The estimation is performed by incorporating remote imaging data of extreme ultra-violet (EUV) from the IMAGE satellite into a simulation model of the plasmasphere. We assume the magnetospheric electric potential distribution to be unknown, and estimate it in the course of the assimilation process. The plasmaspheric ion distribution is estimated according to the estimated electric potential and the plasmasphere simulation model.
At present, we are conducting data assimilation experiments using artificial EUV data sets to evaluate the EUV data assimilation approach. The experimental result suggests that the data assimilation of the EUV imaging data provides useful information for understanding the temporal and spatial variations of the plasmasphere.

plasmasphere, data assimilation, EUV imaging data

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