太陽風3次元MHDシミュレーションへのデータ同化による流源関数評価

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Data assimilation of the solar wind in the inner heliosphere to estimate the source function

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The solar wind and the large-scale disturbances propagate in the inner heliosphere, and the inner boundary condition as described by a source function controls the global solar wind structures by the magnetohydrodynamic (MHD) solar wind model. Several solar wind models use the solar wind velocity at the inner boundaries as estimated from magnetic synoptic map using an empirical model relation, such as Wang-Sheeley-Arge relationship. The empirical relation is based on statistical observations in the solar ecliptic plane independent of the solar activity and time variation. The purpose of this study is to improve the source function of the solar wind using observation data by applying a sequential data assimilation method. We use three-dimensional MHD model of the solar wind with an inner boundary condition based on SOHO/MDI magnetic field data. In this study, the solar wind velocity around the inner boundary is represented as a function of magnetic field with variable coefficients. These coefficients are constrained by the solar wind velocity observation data obtained from the interplanetary scintillation (IPS). As a preliminary method, the IPS solar wind velocity is put into the simulation by a weighting as a function of observation and system (model and inner boundary) errors. The number of model grids is 41 (radial) x 6,912 (longitude and latitude) = 283,392, while that of observation data is 6,912 for the inner boundary and ˜1,500 per one day from the IPS observation. We show the present status of our approach for the solar wind data assimilation.