

R008-01

C会場：9/25 PM1 (13:45-15:30)

13:45~14:00

スーパーコンピューター富岳における磁気流体コード CANS+ の性能チューニングと超高解像度磁気圏シミュレーション

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Performance tuning of the MHD simulation code on Fugaku and super-high-resolution global magnetospheric simulations.

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We have developed a global magnetohydrodynamic (MHD) simulation model of the magnetosphere using the public MHD code CANS+ (Matsumoto et al., 2019; Matsumoto and Miyoshi, 2022). This model was developed to virtually observe the soft X-ray emission by the charge exchange process between the high-charge state ions in the solar wind and the Earth's exosphere and for upcoming X-ray imaging missions of GEO-X and SMILE.

On the other hand, we recently started a project called "Elucidation of Solar-Terrestrial Environment with Simulation and AI" on the Supercomputer Fugaku. In this project, we plan to conduct different simulation models of the solar convection zone, the solar corona, the solar wind, and the Earth's magnetosphere. Using Fugaku's huge computational resources, we examine super-high-resolution MHD simulations to examine turbulence in the plasma sheet and particles' turbulent transport to the inner magnetosphere. The numerical resolution approaches the limit of the MHD approximation with a few hundred kilometers (0.04 the Earth's radius) of the computational cell.

In this presentation, we report performance tuning results of the CANS+ code on Fugaku, its application to the super-high-resolution global MHD simulations, and turbulent natures in the magnetosphere. We also discuss the possibility of remote imaging of the soft X-ray emission reflecting the turbulent structure around the magnetopause.