

R010-20

B会場：11/25 PM1 (13:45-15:45)

14:00～14:15:00

Physics-Informed Neural Network を用いた磁気嵐予測システムの開発

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Prediction of the Dst index using Physics-Informed Neural Networks

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Geomagnetic storms, characterized by significant enhancements of ring current, are often associated with severe space weather events. The Dst index quantifies the intensity of geomagnetic storms, and accurate forecasting of Dst is essential for space weather forecast. Burton et al. (1975) developed an empirical equation for the temporal evolution of the Dst index, in which the rate of change of Dst is described in terms of the dawn-dusk solar wind electric field (the product of solar wind velocity and the north-south IMF component) and the loss. In their model, the injection rate of the ring current is linearly proportional to the dawn-dusk electric field, while the decay of the ring current is represented by an exponential term with a characteristic e-folding time. In this study, we develop a Physics-Informed Neural Network (PINN) approach for Dst forecast. PINNs are a class of neural network models that incorporate physical laws, typically expressed as differential equations, directly into the training process. By embedding the empirical equation into the neural network, our PINN follows the basic physical rules of Dst variation while simultaneously learning from data. In this presentation, we report on the current progress in developing the PINN for the Dst index.