
Magnetic Field Reconstruction Using PINN(Physics-Informed Neural Networks)

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Abstract

Reconstructing magnetic field structures from spatially limited satellite data is important for understanding space plasma physics. In this study, we explore the use of Physics-Informed Neural Networks (PINNs) to reconstruct magnetic fields from MMS satellite observations. By incorporating the divergence-free condition of the magnetic field and the force balance equation into the training process, PINNs provide a promising framework for inferring physically consistent field structures, even with sparse inputs. Using only line-profile data along the satellite path, we apply this method to both 2D and 3D cases, and present results to assess its potential and limitations.

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