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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 47839-2026

**Space environment - Model of the Earth's magnetospheric
magnetic field**

空间环境 地球磁层磁场模型

(English Translation)

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Foreword

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This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

This document is modified to adopt ISO 22009:2023 "Space environment (natural and artificial) - Magnetic field model of the Earth's magnetosphere".

This document has undergone significant structural adjustments compared to ISO 22009:2023. A comparison of the structural numbering changes between the two documents is provided below.

See Appendix A for the table.

This document differs significantly from ISO 22009:2023. The relevant clauses are indicated in vertical margins.

A single vertical line (|) is used to indicate these differences. A summary of these technical differences and their causes can be found in Appendix B.

The following editorial changes have been made to this document.

- To align with my country's technical standards system, the standard name has been changed to "Magnetic Field Model of Earth's Magnetosphere in Space Environment";
- Correct $\cos \phi$ in formula (C.3) to $\cos \psi \cos \phi$ (see C.3);
- Correct "polar cap radius" to "polar cap angle" (see C.7);
- Replace "nv2" with "Dp" in formula (D.2) (see D.3);
- Change the IMF north-south component to Bsn (see D.7);
- Add more sources of model comparison data (see E.5).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Chinese Academy of Sciences.

This document is under the jurisdiction of the National Technical Committee on Standardization of Aerospace Technology and Its Applications (SAC/TC 425).

1 Scope

This document provides the general concepts and assumptions of the Earth's magnetosphere magnetic field model, and specifies the modeling and usage requirements.

This document is applicable to the construction of new models for the Earth's exosphere magnetic field, space weather forecasting, satellite communication and navigation, and on-orbit environmental assessment of spacecraft.

Research on orbit design, magnetospheric physics processes and mechanisms (including solar wind-magnetospheric interaction processes, geomagnetic storm and substorm dynamics, space) Applications include current system inversion and identification of seismic electromagnetic anomalies.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are listed below.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 32452 Space Terminology - Space Environment

3 Terms and Definitions

The terms and definitions defined in GB/T 32452 and the following terms and definitions apply to this document.

Magnetospheric magnetic field external magnetospheric magnetic field 3.2 Magnetospheric magnetic field sources the term refers to the electric current systems that generate magnetic fields in the Earth's magnetosphere, and they are one of the main sources of the Earth's external magnetic field (external field).

Note 1: Magnetospheric magnetic field sources include.

-- Current flowing through the magnetopause and shielding the Earth's dipole magnetic field;

--The magnetotail current is generated by the westward cross-tail current in the thin current sheet near the equator on the night side through a closed loop of the top and bottom return currents of the magnetosphere.

--Circular currents, including symmetrical circular currents carried by charged particles captured by the Earth's magnetic field, and currents that close via the field-oriented

currents and ionospheric currents in region 2.

Partial loop current;

--Field current is generated by a loop that flows along the magnetic field lines of the aurora and closes with the current in the ionosphere through the magnetopause; specifically, it refers to the field current in region 1.

--The current flowing through the top of the magnetosphere and shielding the loop current and part of the loop current magnetic field.

Among them, the magnetotail current, loop current, and field current are currents flowing inside the Earth's magnetosphere.

Note 2: In different magnetospheric magnetic field models, either a predefined current system or a current system determined by parameters calculated from satellite data is used.

Note 3: Currents entirely within the ionosphere (ionospheric currents) contribute to the magnetic field below 1000 km. Above 1.5 RE (the Earth's average radius) in space...

The contribution of ionospheric current is insignificant. The magnetic field generated by ionospheric current is not considered in this document.

Internal magnetospheric magnetic field Magnetic fields generated by internal sources below the Earth's magnetosphere.

Note: Includes the main magnetic field (modeling standard reference GB/T 44001-2024) and ionospheric magnetic field, but excludes the field-directed current magnetic field.