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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Space environment (natural and artificial) - Cosmic ray and solar energetic particle penetration inward the magnetosphere - Method of determination of the effective vertical cut-off rigidity

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foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules of Standardization Documents"

drafted:

This document is equivalent to ISO 17520:2016 "Space Environment (Natural and Artificial) Cosmic Rays and Solar Energy Particles Penetrating the Magnetosphere Effectively

Determination of perpendicular geomagnetic cut-off stiffness":

This document adds a chapter "Normative References":

Please note that some content of this document may be patented: The issuing agency of this document assumes no responsibility for identifying patents:

Introduction

This document describes the basic requirements for calculating the effective vertical cut-off stiffness for charged particles entering the Earth's magnetosphere: This document establishes the

Calculate the effective vertical at the same altitude, different geographic locations (latitude and longitude), different geomagnetic disturbances (described by Kp index) and different local time conditions:

Program for the straight magnetic cut-off stiffness: Models that meet these requirements are described in the appendix through a series of examples: This document is used to estimate penetration

The interplanetary cosmic ray charged particle stream in the spherical magnetosphere, which is important for developing and testing the radiation effects of hardware and living organisms on spacecraft:

This document presents a procedure to simplify the stiffness calculation:

Space environment (natural and artificial)

Cosmic rays and solar energy particles penetrate the magnetosphere

Determination method of effective perpendicular geomagnetic cut-off stiffness

1 Scope

This document describes the effective vertical cut-off stiffness for charged particles in near-Earth space and specifies the main requirements for its calculation: in Appendix A

In , a typical example is used to verify the calculation method:

This document is suitable for developing geomagnetic cut-off stiffness calculation models based on different geomagnetic field models [1]: The geomagnetic cut-off stiffness calculation model is used for

Determine the flow of charged particles penetrating the Earth's magnetosphere, and test and estimate its impact on spacecraft and other equipment:

This document is suitable for the calculation of cosmic ray charged particles (galactic cosmic rays, solar cosmic rays and anomalous cosmic rays) in arbitrary components with large stiffness

Transmission in the geomagnetic field of 0:2GV particles: The main objectives for determining the normalization of the effective perpendicular geomagnetic cut-off stiffness are as follows:

--- Provide an explicit procedure to calculate the geomagnetic cut-off stiffness within the Earth's magnetosphere reflecting geomagnetic disturbances and local time dependence;

--- Provide a means of estimating charged particle fluxes for space experimental missions to interpret and analyze the effects of charged particles;

---Provide a method for effectively calculating the transfer function of the geomagnetic field in low-altitude spacecraft orbits;

--- Use independent in-orbit interplanetary particle flux data to determine the impact of solar energy particles on spacecraft equipment and astronauts:

2 Normative references

There are no normative references in this document:

3 Terms and Definitions

The following terms and definitions apply to this document:

3:1

internal (main) magnetic field

The magnetic field generated by the Earth's core:

Note 1: See ISO 16695:

Note 2: Can be represented by the International Geomagnetic Reference Field (IGRF) model:

3:2

International Geomagnetic Reference Field

IGRFmodel IGRFmodel

The International Geomagnetic Reference Field describes the endogenous magnetic field in the form of spherical harmonics:

Note 1: See reference [2]:

Note 2: The time variation of the expansion coefficient is very small:

Note 3: The International Association of Geomagnetism and Upper-Air Physics (IAGA) is responsible for the development and revision of the IGRF model, and the coefficients are revised every 5 years: This document does not discuss

endogenous magnetic field:

3:3

external (magnetospheric) magnetic field

The magnetic field generated by the source current of the magnetosphere: