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GB/T 44776-2024

**General requirements of simulation analysis for space
environments and their effects on spacecraft**

航天器空间环境及其效应仿真分析通用要求

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Foreword

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1 Scope

GB/T 44776-2024 sets the general requirements for simulating the space environment and its effects on spacecraft. Every design decision on a satellite, the shielding thickness, the part selection, the surface materials, the orbit-average power, rests on a prediction of an environment nobody can measure in advance, and those predictions are made with models whose choice and use vary between organisations enough to change the answer materially. The standard imposes a common process. It sets the general process of the simulation analysis, then the treatment of each environment in turn, the neutral atmosphere and atomic oxygen, the plasma and surface and internal charging, the trapped radiation belts, solar particle events and cosmic rays with the total dose, displacement damage and single event effects that follow, the micrometeoroid and debris flux, the thermal and vacuum environment and the ultraviolet and contamination effects, giving for each the models to be used, the input parameters, the analysis method, the outputs and the verification and documentation of the analysis. It took effect on 26 October 2024.

This document specifies the general requirements for spacecraft space environment and its effects simulation analysis, including the space environment and its effects simulation analysis General process, mission analysis, space environment and its effect factor analysis, space environment and its effect parameter analysis, solar activity analysis, planetary magnetism Field impact analysis, orbit analysis and modeling, spacecraft structure analysis and modeling, space environment simulation analysis, space environment and its effects simulation analysis analysis, simulation analysis result output and other requirements. This document applies to spacecraft and its materials, components, assemblies, etc. in vacuum, charged particles, ultraviolet radiation, neutral atmosphere (including atomic oxygen), Plasma, pollution, micrometeoroids and space debris, dust and dust storms and other environments and their single particle effects, total ionization dose effects, displacement damage effects Effects of surface charge and discharge, deep charge/internal charge, atomic oxygen erosion, micrometeoroid and space debris impact, and contamination It is also applicable to the design and development of simulation analysis software and codes for spacecraft space environment and its effects, as well as the space environment of organisms. It is used as a reference for analysis of the space environment and its effects.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 29079 Spacecraft orbit classification and common parameter symbols

GB/T 30114.2 Terminology of Space Science and Its Applications Part

3 Terms and Definitions

The terms and definitions defined in GB/T 29079, GB/T 30114.2 and GB/T 32452 and the following terms and definitions apply to this document.