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**Analytical calculation method for the orbital perturbation of
space objects**

空间物体轨道摄动解析计算方法

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Table of Contents

1.Scope	1
2 Normative References	1
3.Terms and Definitions	1
4 Symbols	2
4.1 Basic Symbols	2
4.2 Auxiliary Symbols	3
5 General Requirements	4
5.1 Time System	4
5.2 Coordinate System	4
5.3 Orbital State Quantities	4
5.4 Normalization	4
5.5 Orbit Type Classification	5
6.Basic Model for Analytical Calculation of Orbital Perturbation of Space Objects	5
6.1 Relationship between instantaneous roots and average roots	5
6.2 Change of average number of roots over time	5
7.1 Calculation process for converting instantaneous roots to average roots	6
7.2 Calculation process for converting average root number to instantaneous root number	6
7.3 Calculation process of extrapolated average roots	6
39 References	40

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. 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 and is under the jurisdiction of the National Technical Committee on Standardization of Aerospace Technology and Its Applications (SAC/TC425). This document was drafted by: Nanjing University, National Astronomical Observatories of the Chinese Academy of Sciences, Xi'an Satellite Control Center, and Beijing Aerospace Flight Control Center. China Aerospace Standardization Institute. The main drafters of this document are. Tang Jingshi,

Liu Jing, Cheng Haowen, Liu Lin, Wang Yanrong, Cao Jianfeng, Zheng Fengchun, Li Dawei, Hu Songhua, and Zhang Yao. Gan Qingbo, Quan Haofang, Zhao Nanying. Analytical Calculation Method for Orbital Perturbation of Space Objects

1 Scope

GB/T 47036-2026 is the Chinese national standard covering the analytical propagation of an orbit - the Earth's oblateness, atmospheric drag, lunar and solar attraction and radiation pressure, computed in closed form rather than by numerical integration, which is what makes it fast enough to screen tens of thousands of catalogued objects against each other. First edition, 22,000 words, in force since 1 May 2026, and it belongs with the debris size estimation standard GB/T 47809-2026. It was issued on 28 January 2026 and has been in force since 1 May 2026, as a first edition. The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document describes an analytical calculation method for the orbital perturbation of a space object. This document applies to calculations such as instantaneous radical transformation and orbital extrapolation for space objects orbiting the Earth. It is used for space target cataloging and navigation. Specific tasks include spacecraft tracking and control and operation management, collision risk calculation, long-term orbit evolution, orbit life estimation, safety avoidance and deorbit strategy formulation, etc. Calculate the scenario.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. 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 30114.3 Terminology for Space Science and its Applications Part

3 Terms and Definitions

The terms and definitions defined in GB/T 30114.3, GB/T 43223 and GB/T 45621, as well as the following terms and definitions, apply to this document.

3.1 non-singular element The orbital parameters defined based on Kepler elements eliminate one or more singularities that could cause the definition of Kepler elements to fail.

Note. One type of orbital element.

3.2 Orbit perturbation For a space object orbiting the Earth, in addition to the Earth's two-body gravitational pull, other disturbances affect its orbit.

3.3 short-period term The terms with short periods and rapid changes in the orbital elements of a space object.

Note. In mathematics, this type of term is represented by an average value of zero over the orbital period.

3.4 Instantaneous roots osculating element Keplerian elements or singularity-free elements that describe the actual orbital state of a space object at a given moment.

Note. Also known as "instantaneous roots", "kissing root count", or "closest root count".

3.5 mean element The value obtained by subtracting the short-period term from the instantaneous roots at a given moment can describe the average motion of a spatial object at that moment. Keplerian roots of a state or roots without singularities.

Note. Also known as "flat root". Sometimes the average number of roots defined in this way is also called the pseudo-average root or pseudo-flat root.