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

GB/T 42577-2023

**Definitions and descriptions of BeiDou/global navigation
satellite system (GNSS) satellite parameters for high precision
application**

北斗/全球卫星导航系统（GNSS）卫星高精度应用参数定义及描述

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Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 Abbreviations	3
6 Phase Center Variation	5
18 Reference	20

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 for Standardization Documents" drafting: Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents: This document was proposed by the Equipment Development Department of the Central Military Commission: This document is under the jurisdiction of the National Beidou Satellite Navigation Standardization Technical Committee (SAC/TC544): This document is drafted by: Shanghai Astronomical Observatory of Chinese Academy of Sciences, China Satellite Navigation Engineering Center, China Academy of Space Technology, Chinese Academy of Sciences Academy of Microsatellite Innovation Research Institute, Xi'an Institute of Surveying and Mapping, Wuhan University: The main drafters of this document: Song Shuli, Jiao Wenhai, Zheng Jinjun, Liu Yingchun, Liu Ying, Chen Qiuli, Lin Xia, Jiao Guoqiang, Ruan Rengui, Li Xingxing, Chang Kewu, Hu Xiaogong, Zhang Xu, Su Mudan, Wang Kai, Zhou Weili, Huang Chao, Chen Qinming: Beidou/Global Navigation Satellite System (GNSS) satellites Definition and description of high-precision application parameters

1 Scope

GB/T 42577-2023 defines the satellite parameters that high-precision positioning depends on and the file format in which they are exchanged. Ordinary navigation gets metres from the broadcast ephemeris. Getting centimetres requires much more about each satellite than the broadcast message carries: precise orbit and clock products, the offset between the satellite's centre of mass and its antenna phase centre, the attitude the spacecraft is holding, and the solar radiation pressure model without which a precise orbit degrades within hours. These are produced by analysis centres and consumed by receivers and processing software, and they are useless unless both ends agree on exactly what each quantity means. This document specifies the definition and description of those parameters

and the format of the files that carry them, covering satellite identification, basic satellite parameters, and light pressure calculation parameters among others. It applies to the generation, release and use of satellite parameters for BeiDou high-precision orbit determination, positioning and timing, and addresses GPS and the other GNSS constellations alongside BeiDou. Under ICS 33.070.40 and CCS V70, it is for analysis centres, receiver manufacturers and precise positioning service operators.

This document specifies the definition, description and file format of satellite parameters in Beidou/Global Navigation Satellite System (GNSS) high-precision applications: formula etc: This document is applicable to the generation, release and use of Beidou satellite navigation system high-precision orbit determination, positioning, timing and other application-related satellite parameters: GPS, GLONASS, Galileo and other satellites are used for reference:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document:

GB/T 39267-2020 Terminology of Beidou Satellite Navigation

GB/T 39397:2-2020 Global Continuous Monitoring and Assessment System (iGMAS) File Format Part 2: Products

3 Terms and Definitions

GB/T 39267-2020, GB/T 39397:2-2020 and the following terms and definitions apply to this document: 3:1 is the coordinate system fixed to the satellite body: The origin O_m of the coordinate system is the geometric center of the docking surface of the satellite and the rocket, and the Z_m axis is the satellite array antenna installation position: The normal direction of the installation surface, the X_m axis is the normal direction of the thruster installation surface, the Y_m axis and the X_m , Z_m axes form a right-hand system, perpendicular to the solar panel installation surface Decorate: 3:

2 The satellite's center of mass: [Source: GB/T 39267-2020, 3:2:6] 3:

3 The origin O_a is the center of mass of the satellite, and the three axes X_a , Y_a , Z_a are parallel to the X_m , Y_m , Z_m axes of the mechanical coordinate system, and the directions are the same:

Note: Also known as star-fixed coordinate system and satellite body coordinate system: 3:

4 The origin O_o is the center of mass of the satellite, the orbital plane of the satellite is the

coordinate plane, the axis Z_o points from the center of mass of the satellite to the center of the earth, and the axis Y_o points to the negative side of the orbital plane: In the normal direction, the X_o axis is perpendicular to the Z_o axis in the orbital plane and points to the direction of satellite motion:

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