

ICS 49.020
CCS V 70



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

GB/T 32296-2015

General coordinate systems for space vehicles

航天飞行器常用坐标系

Issued on: December 31, 2015

Implemented on: July 1, 2016

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine;
Standardization Administration of the PRC**

Table of Contents

- 1 Scope
- 2 Normative reference documents
- 3 Terms and definitions

Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by China Aerospace Science and Technology Corporation. This standard is nationalized by the National Aeronautical Technology and Its Application Standardization Technical Committee (SAC/TC425). The drafting of this standard. Beijing Aerospace Systems Engineering Research Institute. The main drafters of this standard. Li Pingqi, He Wei, Geng Guangyou, Wang Jianming, Chang Wuquan, Ma Ying, Xie Xuan, He Zhaowei, Tian Jichao, Liu Xinglong, Li Chongyuan. Spacecraft commonly used coordinate system

1 Scope

China's national standard for the coordinate systems commonly used for space vehicles. It specifies those coordinate systems, their definitions, the general requirements applying to them and the transformation formulae between them, and it applies to the overall design of space vehicles such as launch vehicles and spacecraft and to the interface coordination between the systems that make them up. Its subject sounds abstract and is entirely practical. Every quantity in a space mission - a position, a velocity, an attitude, a thrust direction, a sensor line of sight, an antenna pointing - is a vector, and a vector means nothing until the frame it is expressed in is stated. A launch vehicle mission uses a great many such frames: an Earth-fixed frame for the launch site, a launch inertial frame fixed at the moment of lift-off, a body frame moving with the vehicle, orbital frames for the payload, and sensor frames for each instrument. They differ in origin, in orientation and in whether they rotate, and a number that is correct in one is wrong in another. The failures this causes are not subtle. A vehicle designed by several organisations, each contributing a subsystem with its own natural frame, fails when two of them exchange a vector without agreeing which frame it is in - and the error appears as an attitude, a pointing or a trajectory that is confidently wrong. Fixing the definitions and publishing the transformation formulae between them is what prevents that, and it is why this standard exists for interface coordination as much as for design. Its terminology is drawn from GB/T 32455, the launch vehicle vocabulary, with the key terms repeated here for convenience. Issued on 31 December 2015 and in force since 1 July 2016.

This standard specifies the commonly used coordinate systems, definitions, general requirements and transformation formulas for spacecraft. This standard applies to the overall design of spacecraft such as launch vehicles and spacecraft and interface coordination between systems.

2 Normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 32455 Carrier Terminology

3 Terms and definitions

GB/T 32455 Definitions and the following terms and definitions apply to this document. For ease of use, the following is repeated. Some terms and definitions in GB/T 32455.

3.1 Spacecraft spacevehicle Perform an aircraft that explores, develops, or utilizes specific tasks such as space.

Note. Spacecraft is divided into transport aircraft (such as launch vehicles) and application aircraft (also known as spacecraft).

3.2 Carrier rocket launchvehicle; From the surface of the earth, the air will be paid into the space orbit of the rocket.

Note. generally according to the size of the size can be divided into small, medium, large and heavy carrier rocket, near-Earth orbit carrying capacity of 2t and below the launch vehicle for small transport Rocket, near-Earth orbit carrying capacity 2t ~ 20t carrier rocket for medium-sized carrier rocket, near-Earth orbit carrying capacity 20t ~ 50t carrier rocket Large launch vehicle, near-Earth orbit carrying capacity of 50t and above the launch vehicle for heavy-duty launch vehicle. [GB/T 32455, definition 2.1.2]

3.3 Spacecraft spacecraft In the universe outside the space, the implementation of exploration, development or use of space and other specific tasks of the aircraft. Such as artificial earth satellites Human spacecraft, space detectors and so on.

3.4 Escape the aircraft escapevehicle In the event of a fatal fault, the aircraft is separated from the rocket and fled the dangerous area.

3.5 Celestial sphere An imaginary sphere introduced to determine the position of the celestial body.

Note 1. According to the selected celestial sphere center, there are crescent days, geocentric celestial sphere and so on.

Note 2. The radius of the celestial sphere is arbitrarily selected and can be regarded as mathematically infinite.

chinastandards.org · PREVIEW