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Space engineering – Reference coordinate system; English version EN 16603-10-09:2014

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Gesamtumfang 43 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

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Nationales Vorwort

Dieses Dokument (EN 16603-10-09:2014) wurde vom Technischen Komitee CEN/CLC/TC 5 „Space“ erarbeitet, dessen Sekretariat vom DIN gehalten wird.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-10-01 AA „Interoperabilität von Informations-, Kommunikations- und Navigationssystemen“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Dieses Dokument basiert auf ECSS-E-ST-10-09C.

Dieses Dokument wurde speziell zur Behandlung von Raumfahrtsystemen erarbeitet und hat daher Vorrang vor jeglicher Europäischer Norm, da es denselben Anwendungsbereich hat, jedoch über einen größeren Geltungsbereich (z. B. Luft- und Raumfahrt) verfügt.

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Nationaler Anhang NA
(informativ)

Begriffe

3.1 Begriffe aus anderen Normen

Für die Anwendung dieser Norm gelten die Begriffe aus ECSS-S-ST-00-01.

ANMERKUNG 1 Einige Begriffe wurden aus anderen Dokumenten entnommen, auf die in den Verweisungen in eckigen Klammern verwiesen wird.

ANMERKUNG 2 Es gibt keine Vereinbarung für die Verwendung von Kombinationen der Wörter „Bezug, Koordinate, Rahmen und System“. Diese Begriffe werden in der Praxis oftmals synonym gebraucht. 1989 hat Wilkins [1] dazu einen Vorschlag gemacht. Diese Norm wendet eine einfachere Terminologie an, die mehr mit der alltäglichen Praxis im Einklang steht.

3.2 Spezielle Begriffe für diese Norm

3.2.1
Koordinatensystem
Verfahren zur Festlegung der Position eines Punktes oder einer Richtung hinsichtlich eines festgelegten Rahmens

ANMERKUNG Z. B. kartesische oder rechtwinklige Koordinaten, Kugelkoordinaten und geodätische Koordinaten.

3.2.2
Rahmen
Dreiergruppe von Achsen, zusammen mit einem Ursprung

3.2.3
Trägheitsrahmen
sich nicht drehender Rahmen

ANMERKUNG 1 Die Bezugsrichtungen des Trägheitsrahmens sind auf eine Epoche fixiert.

ANMERKUNG 2 Bei einigen Anwendungen kann der Erdmittelpunkt für die Auswahl des Ursprungs als nicht beschleunigend betrachtet werden

3.2.4
J2000.0
astronomische Standardepoche 1. Januar 2000 12.00 Uhr (TT)

ANMERKUNG Das entspricht JD2451545.0 (TT).

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3.3 Abkürzungen

Für die Anwendung dieser Norm gelten die Abkürzungen aus ECSS-S-ST-00-01 sowie die folgenden Abkürzungen:

Abkürzung	Bedeutung	
AIT	Zusammenbau, Verschaltung und Prüfung	(en: assembly, integration and test)
AIV	Zusammenbau, Verschaltung und Verifizierung	(en: assembly, integration and verification)
BCRS	baryzentrisches Himmels-Bezugssystem	(en: barycentric celestial reference system)
BIPM	Internationales Büro für Maß und Gewicht	(en: Bureau International des Poids et Mesures – international bureau of weights and measures)
CAD	computergestützte Konstruktion	(en: computer aided design)
CCSDS	Beratungsausschuss für Raumfahrt-Datensysteme	(en: Consulatative Committee for Space Data Systems)
CoM	Masseschwerpunkt	(en: centre of mass)
CSD	Koordinatensystemdokument	(en: coordinate systems document)
DoF	Freiheitsgrad	(en: degree of freedom)
DRD	Definition der Anforderungen an Dokumente	(en: document requirements definition)
GCRS	geozentrisches Himmels-Bezugssystem	(en: geocentric celestial reference system)
IAG	Internationale Organisation der Geodäsie	(en: International Association of Geodesy)
IAU	Internationale Astronomische Union	(en: International Astronomical Union)
ICD	Schnittstellenkontrolldokument	(en: interface control document)
ICRF	internationaler Himmels-Bezugsrahmen	(en: international celestial reference frame)
ICRS	internationales Himmels-Bezugssystem	(en: international celestial reference system)
IERS	internationaler Dienst für Erdrotation und Referenzsysteme	(en: international Earth rotation and reference service)
IMCCE	Institut für Himmelsmechanik und die Berechnung der Ephemeriden)	(fr: Institut de Mécanique Céleste et de Calcul des Ephémérides)
ISO	Internationale Organisation für Normung	(en: International Organization for Standardization)
ITRF	internationaler terrestrischer Bezugsrahmen	(en: international terrestrial reference frame)
ITRS	internationales terrestrisches Bezugssystem	(en: international terrestrial reference system)
IUGG	Internationale Union für Geodäsie und Geophysik	(en: International Union of Geodesy and Geophysics)
J2000.0	Epoche 1. Januar 2000 12.00 Uhr (TT)	(en: epoch 2000 January 1.5 (TT))
JPL DExxx	vom Labor für Strahlantrieb entwickelte Ephemeride Nr. xxx	(en: Jet Propulsion Laboratory development ephemeris, number xxx)
L/V	Trägerrakete	(en: launch vehicle)

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MICD	Schnittstellenkontrolldokument für mechanische Schnittstellen	(en: mechanical interface control document)
RCS	Reaktionssteuerungssystem	(en: reaction control system)
SEP	Systemtechnik-Plan	(en: system engineering plan)
SI	Internationales Einheitensystem	(fr: système international)
STR	Sternsensor	(en: star tracker)
TAI	Internationale Atomzeit	(fr: temps atomique international – en: international atomic time)
ToD	wahres Äquatorsystem der Messepoche	(en: true of date)
TT	terrestrische Zeit	(en: terrestrial time)
UTC	koordinierte Weltzeit	(en: coordinated universal time – fr: temps universel coordonné)
WGCCRE	Arbeitsgruppe zu kartografischen Koordinaten und Rotationselementen	(en: Working Group on Cartographic Coordinates and Rotational Elements)
w.r.t.	in Bezug auf	(en: with respect to)

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EUROPEAN STANDARD

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Raumfahrttechnik - Bezugskoordinatensystem

This European Standard was approved by CEN on 28 December 2013.

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Foreword

This document (EN 16603-10-09:2014) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16603-10-09:2014) originates from ECSS-E-ST-10-09C.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2015, and conflicting national standards shall be withdrawn at the latest by January 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been developed to cover specifically space systems and has therefore precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom."

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Introduction

Clear definition of reference directions, coordinate systems and their inter-relationships is part of the System Engineering process. Problems caused by inadequate early definition, often pass unnoticed during the exchange of technical information.

This Standard addresses this by separating the technical aspects from the issues connected with process, maintenance and transfer of such information. Clause 4 provides some explanation and justification, applicable to all types of space systems, missions and phases. Clause 5 contains the requirements and recommendations. Helpful and informative material is provided in the Annexes.

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1 Scope

The objective of the Coordinate Systems Standard is to define the requirements related to the various coordinate systems, as well as their related mutual inter-relationships and transformations, which are used for mission definition, engineering, verification, operations and output data processing of a space system and its elements.

This Standard aims at providing a practical, space-focused implementation of Coordinate Systems, developing a set of definitions and requirements. These constitute a common reference or "checklist" of maximum utility for organising and conducting the system engineering activities of a space system project or for participating as customer or supplier at any level of system decomposition.

This standard may be tailored for the specific characteristics and constraints of a space project in conformance with ECSS-S-ST-00.

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