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Flight dynamics — ~~Concepts, quantities and symbols —~~ Vocabulary — Part 8: ~~Concepts and quantities used in the study of the dynamic~~Dynamic behaviour of aircraft

~~WD/CD/DIS/FDIS stage~~

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Foreword

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 08, Concepts, quantities and symbols for flight dynamics8, *Aerospace terminology*.

This second edition cancels and replaces the first edition (ISO 1151-8:1992-06-15), which has been technically revised.

The main changes compared to the previous edition are as follows:

— new terms for subclause "Typesrelated to types of aircraft motion" have been supplementedadded.

A list of all parts in the ISO 1151 series can be found on the ISO website.

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Introduction

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Flight dynamics — ~~Concepts, quantities and symbols —~~

Vocabulary — Part 8: ~~Concepts and quantities used in the study of the dynamic~~Dynamic behaviour of aircraft

1 Scope

This ~~documents~~document defines terms ~~relating~~related to the concepts and quantities characterizing some classes of aircraft motion and their fundamental dynamic characteristics.

The aircraft is assumed to be rigid, of constant mass and of constant inertia. It is not equipped with systems modifying its natural dynamic behaviour. However, most of the definitions can be applied to the case of a flexible aircraft, of variable mass and of variable inertia.

The general concepts defined in this ~~part of the ISO 1151~~document are applicable to the atmospheric flight phase.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

~~For the purposes of this document,~~ISO and IEC maintain terminology databases for use in standardization at the following ~~terms and definitions apply.~~addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

~~3.1 — IEC Electropedia: available at https://www.electropedia.org/ Terms related to general concepts~~

3.1 General

3.1.1
flight variable
physical quantity, the value of which as a function of time characterizes aircraft motion

3.1.2
flight state
set of values of the *flight variables* (3.1.1)

Note 1 to entry: This concept should not be confused with that of *flight point* ~~[~~(ISO 1151~~, Part~~ 7:1985, 7.5.5~~]~~ ~~[4].~~).

3.1.3

steady flight state
flight state (3.1.2) in which the *flight variables* (3.1.1) considered remain constant with time

3.1.4
quasi-steady flight state
flight state (3.1.2) in which the *flight variables* (3.1.1) considered vary so slowly with time that their variations can be disregarded in the study

3.1.5
unsteady flight state
flight state (3.1.2) in which at least one of the *flight variables* (3.1.1) considered varies so rapidly with time that its variations cannot be disregarded in the study

3.1.6
reference flight state
flight state (3.1.2) chosen as reference in a given study

Note 1 to entry: In most cases, a *steady flight state* (3.1.3) or a *quasi-steady flight state* (3.1.4) is chosen as reference.

Note 2 to entry: In a study covering a certain period of time, it is normal to choose the flight state ~~(3.1.2)~~ immediately prior to this period as a reference.

3.1.7
control input
action on aircraft intended to alter or to maintain the *flight state* (3.1.2)

3.1.8
disturbance
involuntary action which results in a modification in the *flight state* (3.1.2)

Note 1 to entry: The nature of this action can be, for example:

- human;
- atmospheric;
- mechanical~~;~~.
- ~~etc.~~

~~**3.1**~~
3.1.9
input variable
element of the set of quantities characterizing the *control input* (3.1.7) or *disturbance* (3.1.8)

3.1.10
output variable
element of the set of *flight variables* (3.1.1), the developments of which over time characterize the response of aircraft to the *control input* (3.1.7) or *disturbance* (3.1.8) considered

3.2 ~~Terms related to types~~Types of aircraft motion

3.2.1
flight-path
trajectory
three-dimensional locus of origin of the flight-path axis system, usually the centre of mass, relative to the Earth

3.2.2
aircraft plane motion
motion of aircraft characterized by a *flight-path* (3.2.1) contained within a plane

3.2.3
straight flight
aircraft plane motion (3.2.2) characterized by a straight *flight-path* (3.2.1)

3.2.4
horizontal flight
aircraft plane motion (3.2.2) characterized by a *flight-path* (3.2.1) contained within a horizontal plane

3.2.5
symmetrical flight
flight state (3.1.2) of aircraft with zero angle of sideslip ~~(ISO 1151, Part 1, 1.2.1.1) [1]~~

Note 1 to entry: The angle of sideslip is defined in ISO 1151-1:1988, 1.2.1.1.

Note 2 to entry: The geometry of aircraft and the flow are not necessarily symmetrical.

3.2.6
turn
motion of aircraft resulting in a change of *flight-path* (3.2.1) azimuth angle ~~(~~

Note 1 to entry: The flight-path azimuth angle is defined in ISO 1151~~, Part~~ 2:1985, 2.3.1~~) [2].~~

3.2.7
horizontal turn
turn (3.2.6) in *horizontal flight* (3.2.4)

3.2.8
steady turn
horizontal turn (3.2.7) for which the airspeed and the load factor are held constant

Note 1 to entry: If the wind speed, V_w, (ISO 1151~~, Part~~ 2:1985, 2.2.3~~) [2]~~, is zero, the *flight-path* (3.2.1) is circular.

3.2.9
~~(~~isolated~~)~~ longitudinal motion
motion characterized by variations of *flight variables* (3.1.1), related to the three degrees of freedom in the aircraft plane of symmetry

Note 1 to entry: ~~*longitudinal*~~Longitudinal motion ~~(3.2.9)~~ is characterized by variations in relation to a *reference flight state* (3.1.~~5~~6) of

— angle of attack, ~~α,~~α (ISO 1151~~, Part~~ 1:1988, 1.2.1.2~~)~~ [1];),

— inclination angle, ~~Θ,~~θ (ISO 1151~~, Part~~ 1:1988, 1~~,~~ ~~1~~.2.2.2~~.2)~~ [1];),

— airspeed, V~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.1~~)~~ [1];),

— *flight-path* (3.2.1) inclination angle, ~~γ,~~γ (ISO 1151~~, Part~~ 2:1985, 2.3.2~~)~~ [2];), and

— rate of pitch, q~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.6~~)~~ [1];),

while the variations of

— angle of sideslip, ~~β,~~β (ISO 1151~~, Part~~ 1:1988, 1.2.1.1~~)~~ [1];),

— rate of roll, p~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.6~~)~~ [1];), and

— rate of yaw, r~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.6) ~~[1]~~

are zero or negligible.

3.2.10
lateral motion
~~(~~**isolated**~~)~~ **lateral motion**

motion characterized by variations of *flight variables* (3.1.1), related to the three degrees of freedom outside of the aircraft plane of symmetry

Note 1 to entry: ~~*lateral*~~Lateral motion ~~(3.2.9)~~ is characterized by variations in relation to a *reference flight state* (3.1.~~5~~6) of

— angle of sideslip, ~~β,~~β (ISO 1151~~, Part~~ 1:1988, 1.2.1.1~~)~~ [1];),

— bank angle, ~~Φ,~~Φ (ISO 1151~~, Part~~ 1:1988, 1.2.2.2.~~3~~) [1];),

— azimuth angle, ~~Ψ,~~Ψ (ISO 1151~~, Part~~ 1:1988, 1.2.2.2.~~1~~) [1];),

— rate of roll, p~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.6~~)~~ [1];), and

— rate of yaw, r~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.6~~)~~ [1]),

while the variations of

— angle of attack, ~~α,~~α (ISO 1151~~, Part~~ 1:1988, 1.2.1.2~~)~~ [1];),

— airspeed, V~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.1~~)~~ [1];),

— *flight-path* (3.2.1) inclination angle, ~~γ,~~γ (ISO 1151~~, Part 2,~~ 2:1985, 2.3.~~2)~~ [2];), and

— rate of pitch, q~~,~~ (ISO 1151~~, Part~~ 1:1988, 1.3.6) ~~[1]~~

are zero or negligible.

3.2.11
aerodynamic stall