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Flight dynamics — Concepts, quantities and symbols — Part 7: Flight points and flight envelopes

Mécanique du vol — Concepts, grandeurs et symboles — Partie 7: Points de vol et domaines de vol

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1151/7 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

ISO 1151, *Flight dynamics — Concepts, quantities and symbols*, comprises, at present, seven parts:

Part 1 : Aircraft motion relative to the air.

Part 2 : Motions of the aircraft and the atmosphere relative to the Earth.

Part 3 : Derivatives of forces, moments and their coefficients.

Part 4 : Parameters used in the study of aircraft stability and control.

Part 5 : Quantities used in measurements.

Part 6 : Aircraft geometry.

Part 7 : Flight points and flight envelopes.

ISO 1151 is intended to introduce the main concepts, to include the more important terms used in theoretical and experimental studies and, as far as possible, to give corresponding symbols.

In all the parts comprising ISO 1151, the term “aircraft” denotes a vehicle intended for atmosphere or space flight. Usually, it has an essentially port and starboard symmetry with respect to a plane. That plane is determined by the geometric characteristics of the aircraft. In that plane, two orthogonal directions are defined: fore-and-aft and dorsal-ventral. The transverse direction, on the perpendicular to that plane, follows.

When there is more than one plane of symmetry, or when there is none, it is necessary to introduce a reference plane. In the former case, the reference plane is one of the planes of symmetry. In the latter case, the reference plane is arbitrary. In all cases, it is necessary to specify the choice made.

Angles of rotation, angular velocities and moments about any axis are positive clockwise when viewed in the positive direction of that axis.

All the axis systems used are three-dimensional, orthogonal and right-handed, which implies that a positive rotation through $\pi/2$ around the x -axis brings the y -axis into the position previously occupied by the z -axis.

Numbering of sections and clauses

With the aim of easing the indication of references from a section or a clause, a decimal numbering system has been adopted such that the first figure is the number of the part of ISO 1151 considered.

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Flight dynamics — Concepts, quantities and symbols — Part 7: Flight points and flight envelopes

7.0 Introduction

This part of ISO 1151 is intended to define the concepts and terms used in flight dynamics studies to specify aircraft flight conditions and envelopes.

It is necessary, for this purpose, to give definitions specifying the terms: mission, controls, geometric configuration, situation of the systems, state of the aircraft, environment, etc.

These concepts are necessary for safety analyses, for qualification purposes, and they apply to the analysis of operational, experimental or simulated flights, taking into account potential failures and likely environmental conditions.

The following International Standards are necessary as reference documents for application of this part of ISO 1151:

ISO 2533, *Standard atmosphere*.

ISO 5878, *Reference atmospheres for aerospace use*.

7.1 Accomplishment of a mission

No.	Term	Definition
7.1.1	Mission	The purpose of a flight achieved while respecting some constraints, among others, of time and of space. NOTE — The objective and the constraints can be specified in a flight plan.
7.1.2	Flight programme	The preschedule of intermediate objectives required to fulfil the mission (7.1.1) within an authorized flight envelope (7.7.1). NOTE — Provision can be made in the flight programme for some conditional changes of intermediate objectives according to circumstances arising during the flight (failure, meteorology, traffic, etc.).
7.1.3	(Flight) phase	The portion of the flight characterized by an intermediate objective. <i>Examples:</i> take-off, climb, cruise, descent, approach, landing. The intermediate objective is defined with some tolerance as to the accuracy with which the objective is considered to have been achieved, such that the following phase can be initiated under conditions that allow it to be executed.
7.1.4	(Flight) sub-phase	The portion of a (flight) phase (7.1.3) characterized by an elementary objective. <i>Examples:</i> "ground run" in the "take-off" phase, "flare" and "ground run" in the "landing" phase. The elementary objective is defined with some tolerance as to the accuracy with which the objective is considered to have been achieved, such that the following sub-phase can be initiated under conditions that allow it to be executed. NOTE — Following the breakdown of a phase into sub-phases, certain parameters can often be considered as constants during the sub-phase (for example: mass characteristics of the aircraft, state of the atmosphere, etc.).