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BSI Standards Publication

Space systems — Best practices for orbit elements at payload — LV separation

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National foreword

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Foreword

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The committee responsible for this document is ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

Introduction

This Technical Report will provide a recommendatory method for post-launch assessment of the orbit elements precision at separation, which is conductive to improving international communication effect and reducing the risks from errors resulting from miscommunication. It can estimate the orbit elements precision at separation, provide the reference for fuel capacity design of launch vehicle and spacecraft, and then help to reduce the manufactory costs of rocket and payload.

TECHNICAL REPORT **ISO/TR 19473:2015(E)**

Space systems — Best practices for orbit elements at payload — LV separation

1 Scope

This Technical Report provides the best practices for orbit elements at payload-LV separation. It includes orbit elements and calculation conditions, calculation method of orbit elements and their errors at elliptical orbit insertion of various payloads. The fit between the actual and expected values of orbit elements can be used as a criterion of commercial launch.

There are many different sets of orbit elements. Each is best suited for a particular application. The traditionally used set of orbital elements is called the set of Keplerian elements. This Technical Report gives the calculation method of Keplerian elements and the transformation method of all the other orbit elements, in order to satisfy different user's need.

Affected by terrestrial gravitational perturbation, lunisolar gravitation perturbation and other factors, orbit elements change slowly after orbit injection. Orbit elements calculation methods after separation are not included in this Technical Report.

The technical communication and specific progress for orbit elements is relatively easy to be agreed on by applying this Technical Report, which can contribute to avoiding possible disputes.

2 Symbols and abbreviated terms

2.1 Abbreviated terms

BIPM Bureau International des Poids et Mesures

CTP Conventional Terrestrial Pole

GAST Greenwich Apparent Sidereal Time

GMST Greenwich Mean Sidereal Time

GCRF Geocentric Celestial Reference Frame

GPS Global Positioning System

IERS International Earth Rotation and Reference System Service

IRM International Reference Meridian

ITRF International Terrestrial Reference Frame

ITRS International Terrestrial Reference System

LGEIF Launch Geocentric Equatorial Inertial Frame

LV Launch Vehicle

PZ90 Acronym of Russian Parametry Zemli 1990

SI International System of Units