SLOVENSKI STANDARD
oSIST prEN ISO 16610-29:2019

01-marec-2019

Specifikacija geometrijskih veličin izdelka (GPS) - Filtriranje - 29. del: Linearni profilni filtri - Valjčki (ISO/DIS 16610-29:2019)

Geometrical product specifications (GPS) - Filtration - Part 29: Linear profile filters - Wavelets (ISO/DIS 16610-29:2019)

Geometrische Produktspezifikation (GPS) - Filterung - Teil 29: Lineare Profilfilter - Wavelets (ISO/DIS 16610-29:2019)

Spécification géométrique des produits (GPS) - Filtrage - Partie 29: Filtres de profil linéaires - Ondelettes splines (ISO/DIS 16610-29:2019)

Ta slovenski standard je istoveten z: **prEN ISO 16610-29**

ICS:

17.040.20	Lastnosti površin	Properties of surfaces
17.040.40	Specifikacija geometrijskih veličin izdelka (GPS)	Geometrical Product Specification (GPS)

oSIST prEN ISO 16610-29:2019 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 16610-29

ISO/TC **213**

Secretariat: **BSI**

Voting begins on:
2019-01-08

Voting terminates on:
2019-04-02

Geometrical product specifications (GPS) — Filtration —

Part 29:
Linear profile filters — Wavelets

Spécification géométrique des produits (GPS) — Filtrage —

Partie 29: Filtres de profil linéaires - Ondelettes splines

ICS: 17.040.20

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 16610-29:2019(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This second edition cancels and replaces the first edition (ISO 16610-29:2015), which has been technically revised.

A list of all parts in the ISO 16610- series can be found on the ISO website.

Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638). It influences chain links C and F of the chains of standards on profile and areal surface texture.

The ISO GPS matrix model given in ISO 14638 gives an overview of the ISO GPS system of which this document is a part. The fundamental rules of ISO GPS given in ISO 8015 apply to this document. The default decision rules given in ISO 14253-1 apply to the specifications made in accordance with this document, unless otherwise indicated.

For more detailed information on the relation of this document to other standards and the GPS matrix model, see Annex D.

This document develops the terminology and concepts for wavelets.

Geometrical product specifications (GPS) — Filtration —

Part 29:
Linear profile filters — Wavelets

1 Scope

This document specifies biorthogonal wavelets for profiles and contains the relevant concepts. It gives the basic terminology for biorthogonal wavelets of compact support, together with their usage.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16610-1, *Geometrical product specifications (GPS) — Filtration — Part 1: Overview and basic concepts*

ISO 16610-20, *Geometrical product specifications (GPS) — Filtration — Part 20: Linear profile filters: Basic concepts*

ISO 16610-22, *Geometrical product specifications (GPS) — Filtration — Part 22: Linear profile filters: Spline filters*

ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC Guide 99, ISO 16610-1, ISO 16610-20, ISO 16610-22, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

— IEC Electropedia: available at http://www.electropedia.org

3.1
mother wavelet
function of one or more variables which forms the basic building block for wavelet analysis, i.e. an expansion of a signal/profile as linear combination of wavelets

Note 1 to entry: A mother wavelet, which usually integrates to zero, is localized in space and has a finite bandwidth. Figure 1 provides an example of a real-valued mother wavelet.

3.1.1
biorthogonal wavelet
wavelet where the associated wavelet transform is invertible but not necessarily orthogonal

Note 1 to entry: The merit of biorthogonal wavelet is the possibility to construct symmetric wavelet functions, which allows a linear phase filter.

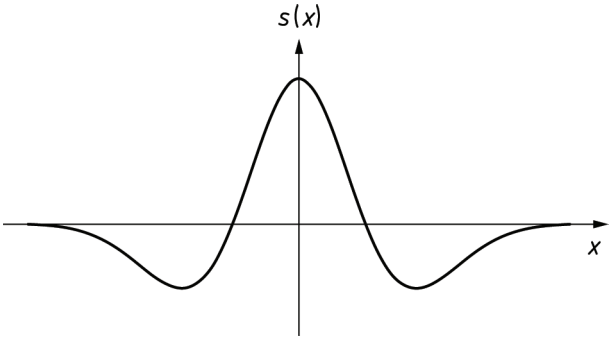

Figure 1 — Example of a real-valued mother wavelet

3.2
wavelet family
$g_{a,b}$
family of functions generated from the *mother wavelet* (3.1) by dilation and translation

Note 1 to entry: If $g(x)$ is the mother wavelet, then the wavelet family $g_{a,b}(x)$ is generated as follows:

$$g_{a,b}(x) = a^{-0,5} \times g\left(\frac{x-b}{a}\right) \quad (1)$$

where

a is the dilation parameter for the wavelet of frequency band $[1/a, 2/a]$;

b is the translation parameter.

3.2.1
dilation
⟨wavelet⟩ transformation which scales the spatial variable x by a factor a

Note 1 to entry: This transformation takes the function $g(x)$ to $a^{-0,5}g(x/a)$ for an arbitrary positive real number a.

Note 2 to entry: The factor $a^{-0,5}$ keeps the area under the function constant

3.2.2
translation
transformation which shifts the spatial position of a function by a real number b

Note 1 to entry: This transformation takes the function $g(x)$ to $g(x - b)$ for an arbitrary real number b.

3.3
discrete wavelet transform
unique decomposition of a profile into a linear combination of a *wavelet family* (3.2) where the *translation* (3.2.2) parameters are integers and the *dilation* (3.2.1) parameters are powers of a fixed positive integer greater than 1

Note 1 to entry: The dilation parameters are usually powers of 2.

Note 2 to entry: Throughout the rest of this document, the discrete wavelet transform is referred to as the wavelet transform.

3.4
multiresolution analysis
decomposition of a profile by a filter bank into portions of different scales

Note 1 to entry: The portions at different scales are also referred to as resolutions (see ISO 16610-20).

Note 2 to entry: Multiresolution is also called multiscale.

Note 3 to entry: See Figure 2.

Note 4 to entry: Since by definition there is no loss of information, it is possible to reconstruct the original profile from the multiresolution ladder structure.

3.4.1
low-pass component
component obtained after convolution with a smoothing filter (low pass) and a decimation

3.4.2
high-pass component
component obtained after convolution with a difference filter (high pass) and a decimation

Note 1 to entry: The weighting function of the difference filter is defined by the wavelet from a particular family of wavelets, with a particular dilation parameter and no translation.

Note 2 to entry: The filter coefficients require the evaluation of an integral over a continuous space unless there exists a complementary function to form the basis expanding the signal/profile.

3.4.3
multiresolution ladder structure
structure consisting of all the orders of the difference components and the highest order smooth component

3.4.4
scaling function
function which defines the weighting function of the smoothing filter used to obtain the smooth component

Note 1 to entry: In order to avoid loss of information on the multiresolution ladder structure, the wavelet and scaling function are matched.

Note 2 to entry: Low-pass component is obtained by convolving the input data with the scaling function.

3.4.5
wavelet function
function which defines the weighting function of the difference filter used to obtain the detail component

Note 1 to entry: High-pass component is obtained by convolving the input data with the wavelet function.

3.4.6
decimation
⟨wavelet⟩ action which samples every *k*-th point in a sampled profile, where *k* is a positive integer

Note 1 to entry: Typically, *k* is equal to 2.

3.5
multiresolution synthesis
reconstruction of a profile by the filter bank matching the analysis filter bank

3.6
lifting scheme
fast wavelet transform that uses splitting, prediction, and updating stages

3.6.1
splitting stage
partition of a profile into “even” and “odd” subsets, in which each sequence contains half as many samples as the original profile