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GB/T 29716.4-2018

Mechanical vibration and shock -- Signal processing -- Part 4: Shock-response spectrum analysis

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Foreword

GB/T 29716 "Mechanical Vibration and Shock Signal Processing" consists of the following parts.

--- Part 1. Introduction;

--- Part 2. Time domain window of Fourier transform;

--- Part 3. Time-frequency analysis method;

--- Part 4. Impact response spectrum analysis;

--- Part 5. Time base analysis method.

This part is the fourth part of GB/T 29716.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This section uses the translation method equivalent to ISO 18431-4.2007 "Mechanical vibration and shock signal processing - Part 4. Impact response

Spectrum Analysis".

The documents of our country that have a consistent correspondence with the international documents referenced in this part are as follows.

---GB/T 2298-2010 Mechanical vibration, shock and condition monitoring vocabulary (ISO 2041.2009, IDT).

This part is proposed and managed by the National Technical Committee for Standardization of Mechanical Vibration, Shock and Condition Monitoring (SAC/TC53).

This section drafted by. Northwest Institute of Mechanical and Electrical Engineering, Hangzhou Yiheng Technology Co., Ltd., China Testing Technology Research Institute, Ministry of Transport

Highway Science Research Institute, Xiaogan Songlin International Measuring Instrument Co., Ltd., Hubei Electric Power Company Electric Power Research Institute, China Shipbuilding Heavy Industry Co., Ltd.

graduate School.

Introduction

In recent years, almost all data analysis has been through the widespread use of digital signal acquisition systems and computer data processing equipment for digital

The data is implemented by mathematical operations. Therefore, data analysis basically refers to digital signal processing.

The experimental mechanics include all steps from test design to data evaluation and understanding, and the analysis of vibration shock test data should be among them.

portion.

GB/T 29716 assumes that the data has been fully restored and has taken into account the sensitivity impact of the instrument. The data mentioned in the article are vibration or rush

The time domain sampling point sequence of the hit acceleration signal, the test method for obtaining these data is not within the scope of this standard (all parts).

This section is a numerical calculation of the impulse response spectrum and is not limited

to typical shock signals. However, this method is for analysis

The impact signal defined in GB/T 2298 (ISO 2041) is meaningless. This shock is an emergency and its time ratio is

The basic period of the system is short and there is no frequency characteristic in the frequency range of interest. It can only be described as a time domain integral and pulse corresponding to a constant frequency.

Although the "maximum response spectrum" is more relevant, the term "shock response spectrum" is still in use.

Historically, shock response spectra were originally used to describe a transient phenomenon that was then called "shock."

Response analysis is often a method of describing vibration or shock that is used when other methods of frequency analysis are not adequately applied. E.g,

Response analysis is used when comparing different types of vibrations. Analysis of different kinds of signals based on spectrum analysis based on Fourier transform

Whenever a periodic signal, a random signal, or a transient signal, a different spectrum is produced.

A typical application of the impulse response spectrum is to describe a dynamic mechanical environment. The analyzed vibration (or shock) signal is usually an acceleration signal.

Number, recorded as a digital quantity and converted into an impulse response spectrum by analysis. This spectrum can be used for environmental testing of a device. How to give according to

The impact response spectrum parameter design test can refer to the corresponding national standards such as GB 2423.57 (IEC 60068-2-81, detailed information can be found

Test literature).

When a vibration and/or impact environment measurement is completed, certain measures must be taken, such as ensuring proper movement at the measurement point.

These measures are beyond the scope of this part of this standard. There are many manuals and materials available in this field [1][2].

Mechanical vibration and shock signal processing

Part 4. Analysis of shock response spectrum

1 Scope

This part of GB/T 29716 describes a digital processing method for shock response spectroscopy (SRS), which passes a digital

The filtered acceleration input signal is given. For different types of shock response spectra, the corresponding filter coefficients and suggested sampling are given.

frequency.

Note. According to the definition of the impulse response spectrum given in ISO 2041, an impulse response spectrum can be defined as the shape of the acceleration, velocity or displacement transfer function.

formula. This section only discusses the case of acceleration inputs.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

ISO 2041 Mechanical vibration, shock and condition monitoring vocabulary (Mechanicalvibration, shockandconditionmonito-

ring-Vocabulary)

3 Terms and definitions

The following terms and definitions as defined by ISO 2041 apply to this document.

3.1

Maximum impact response spectrum maximaxshock-responsespectrum

Take the SRS obtained from the maximum absolute value of the response.

3.2

Negative shock response spectrum negativeshock-responsespectrum

The SRS obtained by taking the negative response maximum value.

3.3

Positive shock response spectrum positiveshock-responsespectrum

Take the SRS obtained by the positive response maximum value.

3.4

Initial shock response spectrum primaryshock-responsespectrum

Take the SRS obtained from the maximum response time during the shock excitation time.