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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 29023.1-2012

**Measurement and characterization of particles by acoustic
methods -- Part 1: Concepts and procedures in ultrasonic
attenuation spectroscopy**

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Foreword

GB/T 29023 "ultrasonic particle measurement and characterization" is divided into the following three parts.

--- Part 1. ultrasonic attenuation spectroscopy concepts and procedures;

--- Part 2. Guidelines for linear theory;

--- Part 3. Guidelines for linear theory.

This is Part 1 GB/T 29023 of.

This section drafted in accordance with GB/T 1.1-2009 given rules.

This section uses the translation method identical with ISO 20998-1:2006 "Measurement and characterization of particles by ultrasonic method - Part 1. ultrasonic attenuation spectroscopy

Concepts and procedures. "

This part of the National particle characterization and sorting and screen Standardization Technical Committee (SAC/TC168) and focal points.

This section is drafted. Shanghai University of Technology, Productivity Promotion Center in the machine.

Introduction

As we all know, the ultrasound can be used to measure the spectrum of colloid dispersions and emulsion particle size distribution [6-9]. The basic principle is that when the ultrasonic

When passing through the sample, the measurement of ultrasonic attenuation dependent on frequency or speed. This attenuation by particles in the sample of acoustic absorption or scattering

Income caused by the dispersion state of the particle size distribution and concentration determines the sound attenuation spectra [10-12]. Once established empirical observations or theoretical calculations

Their contact, in principle, can be determined by the ultrasonic particle size distribution

data. Ultrasound technology for dynamic online measurement of high concentration slurries and emulsions

Very useful. In the past, this test is in quality control laboratories offline, since the equipment is limited by the design principle, the sample must

Be detected after dilution. The ultrasound spectroscopy measurement can be directly online at the original concentration, without changing the status of the original sample; and can also

Dynamic processes (such as flocculation, dispersion, grinding, etc.) in real-time online measurement. Test data can be directly used for process control in order to improve the process through

Process and product performance.

This standard consists of three parts.

Part 1 ultrasonic attenuation spectroscopy terminology, concepts and processes;

Part 2 when the ultrasound spectrum is a linear function of the particle volume concentration, to propose guidelines to determine the particle size spectrum of ultrasound information according to measurement;

Part 3 When ultrasound spectrum is a nonlinear function of particle volume concentration, the proposed guidelines to determine the particle size.

Particle measurement and characterization of ultrasonic method

Part 1. ultrasonic attenuation spectroscopy of concepts and processes

1 Scope

This section GB/T 29023 specifies the ultrasonic measurements of liquid dispersed in one or more of the particle size distribution of the material over the concept and

Drive range includes colloids, dispersions, slurries and emulsions, the size of a typical particle size analysis interval 10nm ~ 3mm, but outside this range

Around the particles can be measured. Volume concentration of the dispersed phase can be measured range from 0.1% to 50% or even higher, depending on the continuum and points

Bulk density contrast quality.

This section applies to dynamic change monitoring particle size distribution, including high concentrations of coagulation and flocculation system.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1

Absorption absorption

Ultrasonic wave through the media, the removal of acoustic scattering other than the energy loss.

2.2

Attenuation attenuation

Muffler extinction

Ultrasonic wave through the media, the total acoustic energy losses, including scattering and absorption.

Note. The unit of measurement is recommended. decibels (dB). It is defined as the common logarithm of the ratio of 10 times the intensity of the incident and the transmitted ultrasonic wave or ultrasonic wave intensity 20 times

Common logarithm of the amplitude ratio of the incident ultrasonic wave and amplitude of the ultrasonic transmission. It can also be selected based on the natural logarithm of the neper (Np) as the unit of measurement, $1\text{Np} =$

8.686dB.

2.3

Attenuation coefficient attenuationcoefficient

Muffler coefficient extinctioncoefficient

Ultrasonic acoustic unit length by the media after the energy attenuation, expressed in dB/cm or Np/cm.

Note. The attenuation coefficient of frequency or frequency squared sometimes expressed in the form in order to distinguish the main attenuation mechanism. For clarity, only considers the standard unit length

Attenuation (dB/cm).

2.4

Attenuation spectrum attenuationspectrum

The measured attenuation coefficient as a function of frequency (in abscissa indicates frequency and the ordinate represents the attenuation coefficient of a curve drawn).

2.5

Bandwidth bandwidth

Frequency range ultrasonic signals contained Typically, the attenuation 3dB frequency difference between the points on the spectrum analyzer.

2.6

Broadband broadband

Wide band ultrasonic signals, characterized in that not less than one-half the bandwidth of the center frequency.