<<柔性材料振动吸声理论>>

图书基本信息

书名：<<柔性材料振动吸声理论>>

13位ISBN编号：9787560532240

10位ISBN编号：7560532241

出版时间：2010-1

出版时间：西安交通大学出版社

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页数：171

前言

The sound absorption material plays an important role in room acoustic and environmental noise control.In general.thetraditional sound absorption material is the porous material, perforated panel, plate and membrane material.British great classical physicist Lord Rayleigh put forward the micropore viscosity sound absorption theory of porous material more than100 years ago.Zwikker and Kosten made further development ofthe theory 50 years ago.Although the research has undergone formore than 100 years, a majority of the scientists still follow suchconcept, the pore space of the porous material and perforatedmaterial produces the viscous effect on the fluctuating air of thesound wave, with which the sound energy is converted into heatenergy. Whereas, the author discovered that the incident soundabsorption coefficient of the fibrous material related to thethickness of the air layer behind it.When the thickness of the airlayer is equal to 1／4 of the wavelength of the incident soundwave, the maximum value of the sound absorption will beproduced, when the thickness of the air layer is equal to 1／2 ofthe wavelength of the incident sound wave, the minimum value ofthe sound absorption will be produced.

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内容概要

The sound absorption material plays an important role in room acoustic and environmental noise control.In general.thetraditional sound absorption material is the porous material， perforated panel， plate and membrane material.British great classical physicist Lord Rayleigh put forward the micropore viscosity sound absorption theory of porous material more than100 years ago.Zwikker and Kosten made further development ofthe theory 50 years ago.Although the research has undergone formore than 100 years， a majority of the scientists still follow suchconcept， the pore space of the porous material and perforatedmaterial produces the viscous effect on the fluctuating air of thesound wave， with which the sound energy is converted into heatenergy.

作者简介

Doctor Xin-an Zhang was born January1 963 He worn the mathematicaI competition prize ln 1 978 when he was a senior middle school student in Xianyang City.In 1 981 atthe age of 1 8.he graduated from Northwest Instituted of Textile Science and Technology， where he remained as a facuIty member and went On to earn his Masters degree in 1989.Since then.he was employed as the associate professor of Xian Polytechnic University Being welI acquainted and good sense of fibrous materials with the research achievements of physical p rope rties Of fibrous mate rialS.in 2004， he was taken in T0ngji University as the Ph D student to performed the research in sound absorption properties of fibrous materials When not teaching and writing， Zhang PU rSUes hiS inte rest in ACUPUnctU re me ridians and exe rcises Taiji Which he believes can prolong Iife and anti-decease.

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章节摘录

In chapter 3, the author has discovered that the soundabsorption of fibrous materials is actually in direct proportion tothe relative amplitude of the sound wave and obtainedaccordingly a mathematical relation expression that the soundabsorption coefficient changes with the frequency. Thetheoretic spectra worked out by this relation expression tallysatisfactorily with the measured spectra of the materials withvarious cavity depth. Further analysis has been made in thischapter concerning this viewpoint, considering that the soundwave actually pushes the material to vibrate.Due to the forcedvibration, the sound energy is absorbed, thus producing ahigher sound absorption coefficient. This viewpoint caninterpret an acoustic phenomenon, that is, when a fabric is usedas a wall facing or a face protective material of a soundabsorber, the sound absorption coefficient is zero or very small,whereas when the fabric hangs independently or there is an airlayer behind, there is a very high sound absorption coefficient.When applying the membrane vibration theory, microporeviscous sound absorption theory and the perforated plateresonance theory to the thin fibrous layer, the author has foundthat the viewpoint that the sound absorption of the fibrous layercomes from the vibration of the material is acceptable. At thesame time, the conclusion arrived at in this chapter that thediameter of the yarn in the fabric is directly proportional to itsspecific acoustic impedance as an example, has proved thisviewpoint.

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