

<<智能结构装置及结构电子系统设计>>

图书基本信息

书名：<<智能结构装置及结构电子系统设计>>

13位ISBN编号：9787560333649

10位ISBN编号：7560333648

出版时间：2012-1

出版时间：哈尔滨工业大学出版社

作者：邹鸿生

页数：237

字数：397000

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

<<智能结构装置及结构电子系统设计>>

内容概要

邹鸿生、岳洪浩主编的《智能结构装置设计及结构电子系统》系统地介绍了智能结构、装置和结构电子系统设计的基础理论和技术领域的应用特点 and 设计方法。

《智能结构装置设计及结构电子系统》可作为高年级本科生及研究生的教材或学习参考书，也可作为相关领域研究人员的参考书。

书籍目录

CHAPTER 1 INTRODUCTION TO SMART MATERIALS

- 1.1 PIEZOELECTRIC MATERIALS
- 1.2 SHAPE MEMORY MATERIALS
- 1.3 ELECTROSTRICTIVE MATERIALS
- 1.4 MAGNETOSTRICTIVE MATERIALS
- 1.5 ELECTRO-AND MAGNETO-RHEOLOGICAL FLUIDS
- 1.6 POLYELECTROLYTE GELS
- 1.7 PYROELECTRIC MATERIALS
- 1.8 OPTO-ELECTROMAGNETO MATERIALS

1.8.1 Photostrictive Materials

1.8.2 Photoferroelectric

Materials

1.8.3 Magneto-optical

Materials

1.9 SUMMARY

REFERENCES

CHAPTER 2 PIEZOELECTRIC MATERIALS AND DEVICES

2.1 PIEZOELECTRIC CONTINUA

2.1.1 Distributed Sensing and

Vibration Controls

2.1.2 Remarks

2.2 MULTIPURPOSE SENSORS

2.2.1 A Multipurpose

Tactile Acceleration Sensor System

2.2.2 Piezoelectricity in a Thick

Polymeric PVDF Flat

2.2.3 Tactile Response of Polymeric

PVDF

2.2.4 Design of Polymeric PVDF

Tactile Sensor

2.2.5 Modeling of the Polymeric

Piezoelectric PVDF Sensor

2.2.6 Damping Estimation

2.2.7 Experimentation

2.2.8 Results and Discussion

2.2.9 Summary

2.3 HIGH-PRECISION MICRO-ACTUATION

2.3.1 A Piezoelectric Bimorph

Micro-displacement Actuator

2.3.2 Design Concept

2.3.3 Piezoelectric Bimorph

Theory

2.3.4 Finite Element

Development

2.3.5 Laboratory Experiments

2.3.6 Results and Discussio

2.3.7 Summary

2.4 DUAL-PURPOSE MICRO-ISOLATOREXCITER

2.4.1 Theoretical Formulation

2.4.2 Piezoelectric Exciter

2.4.3 Active Vibration

Isolation

2.5 EXPERIMENTAL VALIDATION--PROTOTYPE

MODEL

2.5.1 Piezoelectric Exciter

2.5.2 Results and Discussio

2.5.3 Summary

REFERENCES

APPENDIX: EXPERIMENTAL AND THEORETICAL DATA

CHAPTER 3 SHAPE MEMORY MATERIALS AND DEVICES

3.1 BACKGROUND AND FUNDAMENTAL CONCEFFS

3.1.1 Characteristics of Shape

Memory Materials

3.1.2 Crystal Tra formation

3.1.3 Shape Memory Effect

3.1.4 Detailed

Electro-thermo-elastic Behavior

3.2 DEVICES USING SHAPE MEMORY ALLOYS

3.2.1 Automotive

Applicatio

3.2.2 Aerospace and

Aviation

3.2.3 Mechanical Devices

3.2.4 Medical Applicatio

3.2.5 Bioengineering

3.2.6 Common Household

3.2.7 Robotics

3.2.8 Electronics

3.2.9 Co umer Products

3.2.10 Developing Application

Guidelines

3.2.11 Limitatio of

SMA's

3.3 NEW APPLICATIONS

3.3.1 Shape Memory Alloys in

"Fun" Applicatio

3.3.2 Future Applieatio

3.3.3 Summary

REFERENCES

CHAPTER 4 ELECTROSTRICTIVE MATERIALS AND DEVICES

4.1 ELECTROSTR1CTION OF MATERIAL

4.2 COMPARISON BETWEEN ELECTROSTRICS AND

PIEZOELECTRICS

4.3 MANUFACTURING TECHNIQUE

4.4 APPLICATIONS OF ELECTROSTRICTIVE MATERIALS

4.4.1 Actuator

4.4.2 Ultrasonic Application

4.4.3 Capacitor

4.4.4 Discussion

4.4.5 New Horizons

4.5 SUMMARY

REFERENCES

CHAPTER 5 MAGNETOSTRICTIVE MATERIALS AND DEVICES

5.1 MAGNETOSTRICTIVE PROPERTIES

5.2 MAGNETOSTRICTIVE DEVICES

5.2.1 Magnetostrictive Core Line

Hydrophone

5.2.2 Rare Earth Flexoelectric Transducer

ducer

5.2.3 Magnetostrictive Alloys for Hydraulic Valve Control

5.2.4 Magnetostrictive Linear

Displacement Transducer

5.2.5 Spherical Membrane

Omnidirectional Loudspeaker

5.2.6 Self-biased Modular

Magnetostrictive Driver and Transducer

5.2.7 Magnetostrictive Roller Drive

Motor

5.2.8 Low Frequency Sound Transducer

ducer

5.2.9 Giant Magnetostrictive Alloy (GMA)

5.2.10 Temposonics-II

Magnetostrictive Sensor

5.2.11 Magnetostrictive Clamp

5.2.12 Magnetostrictive Transducer

for Logging Tool

5.3 APPLICATIONS

5.3.1 Actuator

5.3.2 Magnetostrictive Linear Displacement Transducer

5.3.3 High Pressure Pump

5.3.4 Magnetostrictive Shaker

5.3.5 Antivibration Systems

5.3.6 Linear Motor

5.3.7 Underwater Communication Equipment

5.3.8 Liquid Level Sensor

5.3.9 Rotational Vibration Sensor

or

5.3.10 Laves Phase Sensor

5.3.11 Human Spinal Monitoring Sensor

or

5.3.12 Human Body Sensor

5.4 SUMMARY

REFERENCES

CHAPTER 6 ER AND MR FLUIDS WITH DEVICES

6.1 PROPERTIES OF ER FLUID

6.2 APPLICATIONS OF ER FLUID

6.2.1 Shock Absorber

6.2.2 Car Suspension Systems

6.2.3 Engine Mounts

6.2.4 Clutches

6.2.5 Monotube Damper

6.2.6 Artificial Limbs

6.2.7 Possible Future Uses

6.2.8 Summary

6.3 PROPERTIES OF MAGNETORHEOLOGICAL FLUID

6.4 APPLICATIONS OF MR FLUID

6.4.1 Shock Absorber

6.4.2 Damper and Engine

Mounts

6.4.3 Brake System

6.4.4 Clutches and Couplings

6.4.5 Valves and Compression

Seals

6.4.6 Motor and Pneumohydraulic

Drives

6.4.7 Heat Transfer Control

6.5 DISCUSSIONS AND SUMMARY

REFERENCES

CHAPTER 7 POLYMERIC GELS AND DEVICES

7.1 CHARACTERISTICS OF POLYMERIC GELS

7.2 APPLICATIONS

7.2.1 Fiber Bundles for Artificial

Muscles

7.2.2 Dimethylformamide and

Dimethylsulphoxide Polymer Films

7.2.3 Interpolyelectrolyte Complexes

(IPEC)

7.2.4 Ionic Polymeric Drug Delivery

System

7.2.5 Artificial Cornea

7.2.6 Synthetic Scleral

Reinforcement Materials for Surgical Use

7.2.7 Biomedical Polyme

7.2.8 Molecular Biose or

7.2.9 Polymeric Membrane

7.2.10 Polymer Blends

7.2.11 Synthetic Polymeric

Gels

7.2.12 Osmosis Polymeric

Membrane

7.2.13 ETFE (Polyethylene

Tetrafluoroethylene) Microporous Polymeric Membrane

7.2.14 Integrated Force Arrays

(IFA)

7.2.15 Polypyrrole,

Poly-N-methylpyrrole, Ply-5-carboxyindole and Polyaniline

7.2.16 Material : Polyaniline Film,

Polyaniline-polyarbonate (PAn-PC) Film

7.2.17 Poly(vinyl

alcohol)-poly(sodium acrylate) Composite Gel (PVA-PAA Gel)

7.3 DISCUSSIONS AND SUMMARY

REFERENCES

CHAPTER 8 PYROELECTRIC MATERIALS AND DEVICES

8.1 PYROELECTRICITY AND FUNDMENTAL THEORY

8.1.1 Pyroelectricity

8.1.2 Theory

8.2 OPERATIONAL ASPECTS OF PYROELECTRICS

8.2.1 Materials

8.2.2 Infrared Ear Thermometer

8.2.3 Optical Wavegnides

8.2.4 Microehannel Anemometer

8.2.5 Determination of Directional

Emissivity of Opaque Materials (300 - 600K)

8.2.6 Security

8.3 PYROELECTRIC APPLICATIONS

8.3.1 Se o

8.3.2 Detecto

8.4 FUTURE APPLICATIONS OF PYROEI,ECTRIC

MATERIALS

8.4.1 Biomedical

8.4.2 Military

8.4.3 Manufacturing

8.5 SUMMARY

REFERENCES

CHAPTER 9 PRECISION SENSOR SYSTEMS

9.1 DISPLACEMENT TRANSDUCERS

9.1.1 Potentiometric and Strain Gage

Position Tra duce

- 9.1.2 Strain Gage Displacement Transducer
- 9.1.3 Linear Variable Differential Transformer
- 9.1.4 Inductive Proximity Probe
- Displacement Measurement Systems
- 9.2 VELOCITY TRANSDUCERS AND SYSTEMS
- 9.2.1 Linear Velocity Transducer
- 9.2.2 Rotary Velocity Transducer
- 9.3 ACCELERATION TRANSDUCERS AND SYSTEMS
- 9.3.1 Strain Gage Accelerometer
- 9.3.2 Piezoelectric Accelerometer
- 9.3.3 Charge Amplifier Signal Conditioning
- 9.3.4 Voltage Amplifier Signal Conditioning
- 9.4 FORCE AND TORQUE TRANSDUCERS
- 9.4.1 Strain Gage Load Cells
- 9.4.2 Column Member Load Cell
- 9.4.3 Cantilever Beam Load Cell
- 9.4.4 Ring Member Strain Gage Load Cell
- 9.5 TORQUE MEASUREMENT TRANSDUCERS
- 9.6 PRESSURE MEASUREMENT SYSTEMS
- 9.6.1 Strain Gage Transducer
- 9.6.2 Piezoelectric Pressure Transducer
- 9.6.3 Effect of Transmission Lines on Measurement of Pressure
- 9.6.4 Short Transmission Lines
- 9.6.5 Long Transmission Lines
- APPENDICES
- APX. 1 DEFINITIONS
- APX. 2 LINEAR PIEZOELECTRICITY RELATIONS
- APX. 3 ELASTIC, PIEZOELECTRIC AND DIELECTRIC RELATIONS

章节摘录

版权页：插图： The concepts of smart,intelligent,and adaptive materials and structures originated in the mid-1980s in an attempt to describe the newly emerging research area of integrating electro-activefunctional materials into large-scale structures as in-situ sensors and actuators.Previously.electroactive materials had only been used in small and micro-scale transducers and precision mechatronic(mechanical+electronic)control systems.The general perception of smart,intelligent,andadaptive materials or structures implies an ability to be clever,sharp,active,fashionable,andsof sophisticated.However, in reality, materials or structures can never achieve true intelligence orreasoning without the addition of artificial intelligence through computers,microprocessors,controllogic,and control algorithms.Accordingly.the materials can only be active and the structures couldultimately be intelligent.Furthermore,the synergistic integration of smart materials,structures,sensors,actuators,and control electronics has redefined the concept of structures from aconventional passive elastic system to an active or adaptive (life-like) multi-functional structronic(structure+electronic)system with inherent self-sensing,diagnosis,and control capabilities[1-4]. Thus,the goal of this paper is to review the fundamental characteristics,design principles,andpractical applications of key smart materials as outlined in TAB 1.1.The smart materials examinedinclude piezoelectrics,shape memory materials,electrostrictive materials,magnetostrictivematerials,electrorheological fluids,magnetorhe0109ical fluids,polyelectrolyte gels,pyroelectrics,photostrictive materials,photoferroelectric materials, magneto-optical materials, andsuperconducting materials.The requirements for multi-field opto-thermo-electro-magneto-mechanicalsystems applied to complicated multi-field control problems coupling elastic,temperature,electric,magnetic,and light interactions are also discussed.

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>