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KEY=SMART - BECKER ROSS

SMART STRUCTURES THEORY

Cambridge University Press *This book focuses on smart materials and structures, which are also referred to as intelligent, adaptive, active, sensory, and metamorphic. The ultimate goal is to develop biologically inspired multifunctional materials with the capability to adapt their structural characteristics, monitor their health condition, perform self-diagnosis and self-repair, morph their shape, and undergo significant controlled motion.*

ACTIVE CONTROL OF SMART STRUCTURES

THEORY AND EXPERIMENT

INTELLIGENT INFRASTRUCTURE

NEURAL NETWORKS, WAVELETS, AND CHAOS THEORY FOR INTELLIGENT TRANSPORTATION SYSTEMS AND SMART STRUCTURES

CRC Press *Recent estimates hypothesize that the US will need $1.6 trillion dollars for the rehabilitation, replacement, and maintenance of existing infrastructure systems within the next 20 years. Presenting a new vision and way of designing and managing the civil infrastructure of the nation, Intelligent Infrastructure: Neural Networks, Wavelets, and Chaos*

MODELING, CONTROL AND IMPLEMENTATION OF SMART STRUCTURES

A FEM-STATE SPACE APPROACH

Springer *This book presents an overview over smart structures - its concepts, its active involvement in the vibration control, their applications and the extensive research work done.*

IUTAM SYMPOSIUM ON SMART STRUCTURES AND STRUCTRONIC SYSTEMS

PROCEEDINGS OF THE IUTAM SYMPOSIUM HELD IN MAGDEBURG, GERMANY, 26–29 SEPTEMBER 2000

Springer Science & Business Media *Proceedings of the IUTAM Symposium on Smart Structures and Structronic Systems, held in Magdeburg, Germany, 26-29 September 2000*

NONLINEAR ANALYSIS OF THIN-WALLED SMART STRUCTURES

Springer Nature *This book focuses on nonlinear finite element analysis of thin-walled smart structures integrated with piezoelectric materials. Two types of nonlinear phenomena are presented in the book, namely geometrical nonlinearity and material nonlinearity. Geometrical nonlinearity mainly results from large deformations and large rotations of structures. The book discusses various geometrically nonlinear theories including von Kármán type nonlinear theory, moderate rotation nonlinear theory, fully geometrically nonlinear theory with moderate rotations and large rotation nonlinear theory. The material nonlinearity mainly considered in this book is electroelastic coupled nonlinearity resulting from large driving electric field. This book will be a good reference for students and researchers in the field of structural mechanics.*

PLATES AND SHELLS FOR SMART STRUCTURES

CLASSICAL AND ADVANCED THEORIES FOR MODELING AND ANALYSIS

John Wiley & Sons *Smart structures that contain embedded piezoelectric patches are loaded by both mechanical and electrical fields. Traditional plate and shell theories were developed to analyze structures subject to mechanical loads. However, these often fail when tasked with the evaluation of both electrical and mechanical fields and loads. In recent years more advanced models have been developed that overcome these limitations. Plates and Shells for Smart Structures offers a complete guide and reference to smart structures under both mechanical and electrical loads, starting with the basic principles and working right up to the most advanced models. It provides an overview of classical plate and shell theories for piezoelectric elasticity and demonstrates their limitations in static and dynamic analysis with a number of example problems. This book also provides both analytical and finite element solutions, thus enabling the reader to compare strong and weak solutions to the problems. Key features: compares a large variety of classical and modern approaches to plates and shells, such as Kirchhoff-Love , Reissner-Mindlin assumptions and higher order, layer-wise and mixed theories introduces theories able to consider electromechanical couplings as well as those that provide appropriate interface continuity conditions for both electrical and mechanical variables considers both static and dynamic analysis accompanied by a companion website hosting dedicated software MUL2 that is used to obtain the numerical solutions in the book, allowing the reader to reproduce the examples given as well as*

solve problems of their own The models currently used have a wide range of applications in civil, automotive, marine and aerospace engineering. Researchers of smart structures, and structural analysts in industry, will find all they need to know in this concise reference. Graduate and postgraduate students of mechanical, civil and aerospace engineering can also use this book in their studies. www.mul2.com

ADAPTRONICS – SMART STRUCTURES AND MATERIALS

Springer Nature *Since the 1980s, scientists have been researching adaptive structures for materials, for multifunctional elements or even for complete systems. Adaptronics (smart materials, smart structures, smart systems) is a field of distinct interdisciplinarity. The book therefore offers an interdisciplinary view of adaptronic systems, materials and functional elements and their applications. The subject matter integrates various engineering disciplines, from electrical engineering and information technology to manufacturing and control engineering, materials engineering and structural mechanics - to name but a few of the relevant subject areas. Starting from the basic principles and variants of adaptronic systems and functional materials, the textbook explains the different construction methods of functional elements. Building on this, readers learn how to apply this knowledge to active shape control, active vibration control and active vibroacoustics. For each of these topics the author presents current examples from research, discusses research results and future research questions. Each of the nine chapters closes with references to further literature. An index of the mathematical symbols used and a keyword index facilitate learning for readers.The book is aimed at Master's students in engineering courses such as mechanical engineering, aerospace engineering, mechatronics, automotive engineering and related courses. The book provides a comprehensive overview for industrial practitioners who want to familiarize themselves with the field of adaptronics and also serves as a reliable reference book.*

ADVANCED THERMAL STRESS ANALYSIS OF SMART MATERIALS AND STRUCTURES

Springer Nature *This is the first single volume monograph that systematically summarizes the recent progress in using non-Fourier heat conduction theories to deal with the multiphysical behaviour of smart materials and structures. The book contains six chapters and starts with a brief introduction to Fourier and non-Fourier heat conduction theories. Non-Fourier heat conduction theories include Cattaneo-Vernotte, dual-phase-lag (DPL), three-phase-lag (TPL), fractional phase-lag, and nonlocal phase-lag heat theories. Then, the fundamentals of thermal wave characteristics are introduced through reviewing the methods for solving non-Fourier heat conduction theories and by presenting transient heat transport in representative homogeneous and advanced heterogeneous materials. The book provides the fundamentals of smart materials and structures, including the background, application, and governing equations. In particular, functionally-graded smart structures made of piezoelectric, piezomagnetic, and magnetoelectroelastic materials are introduced as they represent the recent development in the industry. A series of uncoupled thermal stress analyses on one-dimensional structures are also*

included. The volume ends with coupled thermal stress analyses of one-dimensional homogenous and heterogeneous smart piezoelectric structures considering different coupled thermopiezoelectric theories. Last but not least, fracture behavior of smart structures under thermal disturbance is investigated and the authors propose directions for future research on the topic of multiphysical analysis of smart materials.

SMART STRUCTURES

ANALYSIS AND DESIGN

Cambridge University Press *Introductory text on the analysis and design of smart devices and structures.*

SHELL STRUCTURES: THEORY AND APPLICATIONS

CRC Press *Shells are basic structural elements of modern technology and everyday life. Examples are automobile bodies, water and oil tanks, pipelines, aircraft fuselages, nanotubes, graphene sheets or beer cans. Also nature is full of living shells such as leaves of trees, blooming flowers, seashells, cell membranes, the double helix of DNA or wings of insects. In the human body arteries, the shell of the eye, the diaphragm, the skin or the pericardium are all shells as well. Shell Structures: Theory and Applications, Volume 3 contains 137 contributions presented at the 10th Conference "Shell Structures: Theory and Applications" held October 16-18, 2013 in Gdansk, Poland. The papers cover a wide spectrum of scientific and engineering problems which are divided into seven broad groups: general lectures, theoretical modelling, stability, dynamics, bioshells, numerical analyses, and engineering design. The volume will be of interest to researchers and designers dealing with modelling and analyses of shell structures and thin-walled structural elements.*

DYNAMICS OF ADVANCED MATERIALS AND SMART STRUCTURES

Springer Science & Business Media *Two key words for mechanical engineering in the future are Micro and Intelligence. It is well known that the leadership in the intelligence technology is a marter of vital importance for the future status of industrial society, and thus national research projects for intelligent materials, structures and machines have started not only in advanced countries, but also in developing countries. Materials and structures which have self-sensing, diagnosis and actuating systems, are called intelligent or smart, and are of growing research interest in the world. In this situation, the IUT AM symposium on Dynamics 0/ Advanced Materials and Smart Structures was a timely one. Smart materials and structures are those equipped with sensors and actuators to achieve their designed performance in achanging environment. They have complex structural properties and mechanical responses. Many engineering problems, such as interface and edge phenomena, mechanical and electro-magnetic interaction/coupling and sensing, actuating and control techniques, arise in the development ofintelligent structures. Due to the multi-disciplinary nature ofthese problems, all ofthe classical sciences and*

technologies, such as applied mathematics, material science, solid and fluid mechanics, control techniques and others must be assembled and used to solve them. IUTAM weIl understands the importance ofthis emerging technology. An IUTAM symposium on Smart Structures and Structronic Systems (Chaired by U.

STRUCTRONIC SYSTEMS: SMART STRUCTURES, DEVICES AND SYSTEMS

(IN 2 PARTS)PART I: MATERIALS AND STRUCTURESPART II: SYSTEMS AND CONTROL

World Scientific *This book is concerned with electrostructural systems, particularly the interaction between the control of the structural and electrical (electronic) components. Structronics is a new emerging area with many potential applications in the design of high-performance structures, adaptive structures, high-precision systems, and micro-systems. As structures are increasingly being controlled by electronics, the problems of structural engineering can be separated less and less from those of electronic engineering and control engineering. This graduate-level book fills a gap in the literature by considering these problems while giving an overview of the current state of analysis, modelling and control for structronic systems. It is a coherent compendium written by leading experts in this new research area and gives readers a sophisticated toolbox that will allow them to tackle the modelling and control of smart structures. The inclusion of an extensive, up-to-date bibliography and index makes this volume an invaluable standard for professional reference. Because of the large number of contributions to the present volume, it has been subdivided into two parts, of which this is Part I. This book will be of interest to engineers, materials scientists, physicists and applied mathematicians. The synergistic integration of active (smart) materials, structures, sensors, actuators, and control electronics has redefined the concept of structures from a conventional passive elastic system to an active (life-like) structronic (structure + electronic) system with inherent self-sensing, diagnosis, and control capabilities. Because of its multi-disciplinary nature, the development of structronic systems has attracted researchers and scientists from many disciplines, such as structures, materials, control, electronics, mathematics, manufacturing, electromechanics, and mechanics. In practical applications, this new structronic system can be used as a component of high-performance machines or structural systems, or be an integrated structure itself performing designated function(s). Most common active (smart) materials, such as piezoelectrics, shape-memory alloys, electro- and magneto-strictive materials, and polyelectrolyte gels have been reviewed in Part I. Application examples are also provided and research issues reported on. While the first part focuses primarily on materials and structures, Part II emphasizes control applications and intelligent systems. With the information provided in this two-volume book, scientists and researchers can easily grasp the state of the art of smart materials and structronic systems, and are ready to pursue their own research and development endeavors. Contents:Part I: Materials and StructuresThe Piezoelectric Vibration Absorber Systems (J Holkamp & T Starchville, Jr.)Self-Sensing Control Applied to Smart Material Systems (E Garcia & L D Jones)An Introduction to Active Constrained Layer Damping*

Treatments (S Shen)Static and Dynamic Behavior of Adaptive Wings Carrying Externally Mounted Stores (L Librescu & O Song)Adaptive Design and Active Composite Material Systems (J Tani & J-H Qiu)Microelectromechanics and Functionality of Segmented Cylindrical Transducers (H-S Tzou et al.)Thermomechanical Modeling of Shape Memory Alloys and Composites (D Lagoudas et al.)Active-Passive Hybrid Structural Vibration Controls Via Piezoelectrical Networks (K-W Wang & S Kahn)On-Line Structural Damage Detection (H Shen)On Material Degradation and Failure of Piezoelectric Ceramics (H Sosa)Part II: Systems and ControlNear-Minimum-Time Slewing and Vibration Control of Smart Structures(Y Kim et al.)Active Polyelectrolyte Gels as Electrically Controllable Artificial Muscles and Intelligent Network Structures(M Shahinpoor)Active Dynamic Absorbers — Theory and Application(S Tewani et al.)Active Vibration Sink for Flexible Structures(C-S Chou)Distributed Modal-Space Control and Estimation with Electroelastic Applications(H Öz)Markov Parameters in System Identification: Old and New Concepts(M Q Phan et al.)Effect of System Non-Linearities on the Modified Model Reference Adaptive Control Scheme(H M Sardar & M Ahmadian)Extending Teach-Repeat to Nonholonomic Robots(S B Skaar & J-D Yoder)Dynamic Analysis and Active Vibration Control of Chain Drive Systems(C-A Tan et al.)Basic Concepts of Fault-Tolerant Computing Design(C Aktouf et al.) Readership: Applied mathematicians, applied physicists and mechanical engineers. Keywords:Structronic Systems;Smart Structures;Devices;Systems;Materials;ControlReviews: "... Professors Guran and Tzou coined the word Structronics in the early 1990s as a new discipline describing the synergetic integration of active materials, structures, sensors, actuators, and control electronics. The present two-volume set is the first comprehensive book ever published on this newly emerging area of engineering. I believe anyone who would like to know what modern science and technology can offer for the design of better structures can learn a great deal from this book. Students and educators can use it as supplemental reading in an intermediate or advanced course on Structronics, or to gain a broader knowledge of systems thinking, model materials, and structural systems. Practicing engineers wishing to consolidate their knowledge in smart technology will also find this book an invaluable reference." Dr Bernd Schaefer Director Institute of Robotics and Mechatronics, Wessling, Germany

SPATIAL FILTERING FOR THE CONTROL OF SMART STRUCTURES

AN INTRODUCTION

Springer Science & Business Media *What follows is my personal perspective on early events that played a signi?cant role in the formation of the ?eld now known as Smart Structures. It is by no means meant to be all inclusive or de?nitive in any way, but merely an account of personal experiences that ultimately lead to the development of the material contained and presented herein. On March 23, 1983 then President Ronald Reagan announced his intentions to develop a new system to reduce the threat of nuclear attack and end the strategy of mutual deterrence in an address to the nation entitled, Address to the Nation on Defense and National Security. The system he proposed became known as "Star Wars," after the popular movie,*

because it was meant to provide a protective shield over the nation from space. His speech mobilized the entire nation on a research and development path toward this end. Investigations were conducted into new areas such as space based radar, large aperture antennae and large ?exible mirror concepts. These proposed systems r-resented an entirely new class of structures that proved to provide new challenges in materials, structures, control systems and modeling. For example antennae needed to monitor large areas of real estate in the continental United States required ap-tures on the order of 100 m.

LINEAR CONTROL THEORY AS APPLIED TO SMART STRUCTURES

SMART STRUCTURES AND MATERIALS

MATHEMATICS AND CONTROL IN SMART STRUCTURES

SMART STRUCTURES AND MATERIALS

MODELING, SIGNAL PROCESSING, AND CONTROL IN SMART STRUCTURES

SMART CIVIL STRUCTURES

CRC Press *A smart civil structure integrates smart materials, sensors, actuators, signal processors, communication networks, power sources, diagonal strategies, control strategies, repair strategies, and life-cycle management strategies. It should function optimally and safely in its environment and maintain structural integrity during strong winds, severe earthquakes, and other extreme events. This book extends from the fundamentals to the state-of-the-art. It covers the elements of smart civil structures, their integration, and their functions. The elements consist of smart materials, sensors, control devices, signal processors, and communication networks. Integration refers to multi-scale modelling and model updating, multi-type sensor placement, control theory, and collective placement of control devices and sensors. And the functions include structural health monitoring, structural vibration control, structural self-repairing, and structural energy harvesting, with emphasis on their synthesis to form truly smart civil structures. It suits civil engineering students, professionals, and researchers with its blend of principles and practice.*

TRIBOLUMINESCENCE

THEORY, SYNTHESIS, AND APPLICATION

Springer *This book expounds on progress made over the last 35 years in the theory, synthesis, and application of triboluminescence for creating smart structures. It presents in detail the research into utilization of the triboluminescent properties of certain crystals as new sensor systems for smart engineering structures, as well as triboluminescence-based sensor systems that have the potential to enable wireless, in-situ, real time and distributed (WIRD) structural health monitoring of composite structures. The sensor component of any structural health monitoring (SHM) technology — measures the effects of the external load/event and provides the*

necessary inputs for appropriate preventive/corrective action to be taken in a smart structure — sits at the heart of such a system. This volume explores advances in materials properties and structural behavior underlying creation of smart composite structures and sensor systems for structural health monitoring of critical engineering structures, such as bridges, aircrafts, and wind blades.

SMART□13: SMART MATERIALS AND STRUCTURES

Trans Tech Publications Ltd *Volume is indexed by Thomson Reuters CPCI-S (WoS). Smart materials and structures is an area of technology which has been around for approximately 30 years or more where materials and structures are augmented by sensing and actuation functionality, and those functions are combined with control elements, all becoming an integral part of the materials and structures considered. This book collects selected Plenary Lectures and Key-Note Lectures from the VI Eccomas Thematic Conference on Smart Structures and Materials (SMART□13), June 24-26, 2013, Torino, Italy.*

SMART STRUCTURES AND MATERIALS

SMART STRUCTURES AND INTEGRATED SYSTEMS

MECHANICS OF LAMINATED COMPOSITE PLATES AND SHELLS

THEORY AND ANALYSIS, SECOND EDITION

CRC Press *The use of composite materials in engineering structures continues to increase dramatically, and there have been equally significant advances in modeling for general and composite materials and structures in particular. To reflect these developments, renowned author, educator, and researcher J.N. Reddy created an enhanced second edit*

SHAPE MEMORY ALLOY ENGINEERING

FOR AEROSPACE, STRUCTURAL AND BIOMEDICAL APPLICATIONS

Elsevier *Shape Memory Alloy Engineering introduces materials, mechanical, and aerospace engineers to shape memory alloys (SMAs), providing a unique perspective that combines fundamental theory with new approaches to design and modeling of actual SMAs as compact and inexpensive actuators for use in aerospace and other applications. With this book readers will gain an understanding of the intrinsic properties of SMAs and their characteristic state diagrams, allowing them to design innovative compact actuation systems for applications from aerospace and aeronautics to ships, cars, and trucks. The book realistically discusses both the potential of these fascinating materials as well as their limitations in everyday life, and how to overcome some of those limitations in order to achieve proper design of useful SMA mechanisms. Discusses material characterization processes and results for a number of newer SMAs Incorporates numerical (FE) simulation and integration procedures into commercial codes (Msc/Nastran, Abaqus, and others) Provides detailed examples on design procedures and optimization of SMA-based actuation*

systems for real cases, from specs to verification lab tests on physical demonstrators One of the few SMA books to include design and set-up of demonstrator characterization tests and correlation with numerical models

IUTAM-IASS SYMPOSIUM ON DEPLOYABLE STRUCTURES: THEORY AND APPLICATIONS

PROCEEDINGS OF THE IUTAM SYMPOSIUM HELD IN CAMBRIDGE, U.K., 6–9 SEPTEMBER 1998

Springer Science & Business Media *This collection presents 49 contributions by engineers, architects, biologists, and applied mathematicians interested in deployable structures. Aerospace structures are currently at the leading edge, and this is reflected by a larger number of contributions covering the full spectrum of concepts, simulations, testing, and working systems.*

SMART STRUCTURES AND MATERIALS 1993

MATHEMATICS IN SMART STRUCTURES : 1-3 FEBRUARY 1993, ALBUQUERQUE, NEW MEXICO

AN ANALYSIS AND REGULATOR THEORY FOR THE ACTIVE CONTROL OF A SYSTEM OF PARTIAL DIFFERENTIAL EQUATIONS ARISING IN THE MODELLING OF SMART STRUCTURES AND MATERIALS

POROELASTIC STRUCTURES

Elsevier *Poroelasticity is a continuum theory for the analysis of a porous media consisting of an elastic matrix containing interconnected fluid-saturated pores. In physical terms the theory postulates that when a porous material is subjected to stress, the resulting matrix deformation leads to volumetric changes in the pores. This book is devoted to the analysis of fluid-saturated poroelastic beams, columns and plates made of materials for which diffusion in the longitudinal direction(s) is viable, while in the perpendicular direction(s) the flow can be considered negligible because of the micro-geometry of the solid skeletal material. Many microstructures and fabrication schemes could be imagined, which would produce bulk materials with the postulated behavior. The book provides a methodology and a theoretical basis for investigating the mechanical behaviors of the structural elements made of such materials. It is recognized that the response of the poroelastic structural element to loading is sensitive to the properties of the fluid and to the diffusion boundaries, which can be easily altered in practice. Therefore, such structural elements and thus their features are potentially controllable. In other words, it could be possible to convert such elements into intelligent or smart structures. If this is so, it would be interesting that such structural elements could work as both sensors and actuators, e.g. the fluid can "feel" the change of the temperature by changing its viscosity and this results in a change of the behavior of the structure. The present book is the first of its kind; there does not exist in the professional literature any book which deals with this subject. Chapter 1 is a general introduction and overview.*

The governing equations for beams are presented in Chapter 2. Chapter 3 then presents analytical solutions for the quasi-static bending problem. Series solutions are found for normal loading with various mechanical and diffusion boundary conditions. The finite element method is developed and employed for the quasi-static beams and columns with small deflections in Chapter 4. In Chapter 5 solutions are found for free and forced vibrations of poroelastic beams. Chapter 6 deals with large deflections of beams. The stability of poroelastic columns is investigated in Chapter 7. Three problems are considered: buckling, post-buckling, and dynamic stability. Formulations are found in Chapter 8 for fluid-saturated poroelastic plates consisting of a material, for which the diffusion is possible in the in-plane directions only, both for bending and for in-plane loading. This book attempts to constitute a reasonably self-contained presentation of a wide spectrum of problems related to the analysis of the type of poroelastic structure considered.

BEAM STRUCTURES

CLASSICAL AND ADVANCED THEORIES

John Wiley & Sons *Beam theories are exploited worldwide to analyze civil, mechanical, automotive, and aerospace structures. Many beam approaches have been proposed during the last centuries by eminent scientists such as Euler, Bernoulli, Navier, Timoshenko, Vlasov, etc. Most of these models are problem dependent: they provide reliable results for a given problem, for instance a given section and cannot be applied to a different one. Beam Structures: Classical and Advanced Theories proposes a new original unified approach to beam theory that includes practically all classical and advanced models for beams and which has become established and recognised globally as the most important contribution to the field in the last quarter of a century. The Carrera Unified Formulation (CUF) has hierarchical properties, that is, the error can be reduced by increasing the number of the unknown variables. This formulation is extremely suitable for computer implementations and can deal with most typical engineering challenges. It overcomes the problem of classical formulae that require different formulas for tension, bending, shear and torsion; it can be applied to any beam geometries and loading conditions, reaching a high level of accuracy with low computational cost, and can tackle problems that in most cases are solved by employing plate/shell and 3D formulations. Key features: compares classical and modern approaches to beam theory, including classical well-known results related to Euler-Bernoulli and Timoshenko beam theories pays particular attention to typical applications related to bridge structures, aircraft wings, helicopters and propeller blades provides a number of numerical examples including typical Aerospace and Civil Engineering problems proposes many benchmark assessments to help the reader implement the CUF if they wish to do so accompanied by a companion website hosting dedicated software MUL2 that is used to obtain the numerical solutions in the book, allowing the reader to reproduce the examples given in the book as well as to solve other problems of their own www.mul2.com Researchers of continuum mechanics of solids and structures and structural analysts in industry will find this book extremely insightful. It will also be of great interest to graduate and postgraduate students of mechanical,*

civil and aerospace engineering.

EVOLUTION EQUATIONS AND THEIR APPLICATIONS IN PHYSICAL AND LIFE SCIENCES

CRC Press *This volume presents a collection of lectures on linear partial differntial equations and semigroups, nonlinear equations, stochastic evolutionary processes, and evolution problems from physics, engineering and mathematical biology. The contributions come from the 6th International Conference on Evolution Equations and Their Applications in Physica*

SELF-SENSING CONCRETE IN SMART STRUCTURES

Butterworth-Heinemann *Concrete is the second most used building material in the world after water. The problem is that over time the material becomes weaker. As a response, researchers and designers are developing self-sensing concrete which not only increases longevity but also the strength of the material. Self-Sensing Concrete in Smart Structures provides researchers and designers with a guide to the composition, sensing mechanism, measurement, and sensing properties of self-healing concrete along with their structural applications Provides a systematic discussion of the structure of intrinsic self-sensing concrete Compositions of intrinsic self-sensing concrete and processing of intrinsic self-sensing concrete Explains the sensing mechanism, measurement, and sensing properties of intrinsic self-sensing concrete*

LARGE SPACE STRUCTURES & SYSTEMS IN THE SPACE STATION ERA

A BIBLIOGRAPHY WITH INDEXES

STRUCTURAL HEALTH MONITORING OF CIVIL INFRASTRUCTURE SYSTEMS

Elsevier *Structural health monitoring is an extremely important methodology in evaluating the 'health' of a structure by assessing the level of deterioration and remaining service life of civil infrastructure systems. This book reviews key developments in research, technologies and applications in this area of civil engineering. It discusses ways of obtaining and analysing data, sensor technologies and methods of sensing changes in structural performance characteristics. It also discusses data transmission and the application of both individual technologies and entire systems to bridges and buildings. With its distinguished editors and international team of contributors, Structural health monitoring of civil infrastructure systems is a valuable reference for students in civil and structural engineering programs as well as those studying sensors, data analysis and transmission at universities. It will also be an important source for practicing civil engineers and designers, engineers and researchers developing sensors, network systems and methods of data transmission and analysis, policy makers, inspectors and those responsible for the safety and service life of civil infrastructure. Reviews key developments in research, technologies and applications Discusses systems used to*

obtain and analyse data and sensor technologies Assesses methods of sensing changes in structural performance

SMART STRUCTURES AND MATERIALS

Artech House Publishers *This book introduces the enabling concepts that make up the so-called smart structure and presents a number of brief case studies to illustrate the applications of these concepts. It examines the domains of the individual technologies and defines the challenges faced by the integrator. The book is particularly effective for the potential system user who needs a good technical general background on the subject and is also useful for students and researchers in contributory technologies who want to better understand the context of their work. Consultants in civil and structural engineering will also find it of interest.*

COMPOSITE STRUCTURES

THEORY AND PRACTICE

ASTM International *The objective of the May 1999 symposium from which these 29 papers were drawn was to bring together practitioners and theoreticians in the composite structural mechanics field to better understand the needs and limitations each group works with. Papers are organized under seven general headings: str*

INTELLIGENT MATERIALS AND STRUCTURES

Walter de Gruyter GmbH & Co KG *Intelligent Materials and Structures provides exceptional insights into designing intelligent materials and structures for special applications in engineering. The author introduces the fundamental materials science involved in research endeavors and simultaneously reviews the current state-of-the-art of intelligent materials and structures. Separate chapters are devoted to the thorough examination of theory and application of laminated composite materials, Piezoelectricity, Shape Memory Alloys, Electro- and Magnetorheological fluids as well as Magneto- and Electrostrictive materials. Each chapter contains numerous equations and figures describing theories, models and behavior of the intelligent material discussed. Special attention is paid to applications of intelligent materials to various structures in the aerospace and medical sector, piezoelectric motors as well as piezoelectric and electromagnetic energy harvesting. Contents: Introduction to Intelligent Materials and Structures Laminated Composite Materials Piezoelectricity Shape Memory Alloys Electrorheological and Magnetorheological Fluids Magnetostrictive and Electrostrictive Materials Applications of Intelligent Materials in Structures Energy Harvesting using Intelligent Materials Index*

DAMAGE MODELS AND COMPUTATIONAL TOOLS FOR HEALTH-MONITORING OF SMART STRUCTURES

The primary goal of this research was to develop physically based damage models, computational approaches based on shear deformation plate theories and layerwise theory, a finite element formulation for the analysis of thin and thick laminated

composite structures with embedded sensors/actuators. During the period of this project the following tasks have been completed: (1) literature search to assess damage and failures models; (2) theoretical formulation of the layerwise models for smart composite structures, (3) formulation of damage models, (4) finite element analysis of laminated adaptive plate structures using the layerwise theory, and (S) finite element analysis of laminated adaptive plate structures Using the single-layer theories (classical, first-order and third-order plate theories). Geometric nonlinearities are accounted for and parametric effects of lamination schemes, material properties, and boundary conditions were investigated.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

INTELLIGENT MATERIALS AND STRUCTURES

Walter de Gruyter GmbH & Co KG *Intelligent Materials and Structures provides exceptional insights into designing intelligent materials and structures for special applications in engineering. The author introduces the fundamental materials science involved in research endeavors and simultaneously reviews the current state-of-the-art of intelligent materials and structures. Separate chapters are devoted to the thorough examination of theory and application of laminated composite materials, Piezoelectricity, Shape Memory Alloys, Electro- and Magnetorheological fluids as well as Magneto- and Electrostrictive materials. Each chapter contains numerous equations and figures describing theories, models and behavior of the intelligent material discussed. Special attention is paid to applications of intelligent materials to various structures in the aerospace and medical sector, piezoelectric motors as well as piezoelectric and electromagnetic energy harvesting. Contents: Introduction to Intelligent Materials and Structures Laminated Composite Materials Piezoelectricity Shape Memory Alloys Electrorheological and Magnetorheological Fluids Magnetostrictive and Electrostrictive Materials Applications of Intelligent Materials in Structures Energy Harvesting using Intelligent Materials Index*

SMART STRUCTURES, NONLINEAR DYNAMICS AND CONTROL

Prentice Hall *Nonlinear dynamics and the associated areas of smart structures and control have recently seen an explosion of interest in response to a rich variety of new and interesting research breakthroughs. Although a book of this size cannot contain a detailed summary of all these engaging results, it does offer a sampling of exciting research areas in an assortment of fast-growing branches of mechanics and control. Smart Structures, Nonlinear Dynamics, and Control involves a modicum of applied mathematics and will be of interest to researchers and graduate students in engineering and physics.*

SMART MATERIAL SYSTEMS AND MEMS

DESIGN AND DEVELOPMENT METHODOLOGIES

John Wiley & Sons *Presenting unified coverage of the design and modeling of smart micro- and macrosystems, this book addresses fabrication issues and outlines the*

challenges faced by engineers working with smart sensors in a variety of applications. Part I deals with the fundamental concepts of a typical smart system and its constituent components. Preliminary fabrication and characterization concepts are introduced before design principles are discussed in detail. Part III presents a comprehensive account of the modeling of smart systems, smart sensors and actuators. Part IV builds upon the fundamental concepts to analyze fabrication techniques for silicon-based MEMS in more detail. Practicing engineers will benefit from the detailed assessment of applications in communications technology, aerospace, biomedical and mechanical engineering. The book provides an essential reference or textbook for graduates following a course in smart sensors, actuators and systems.