

Adaptronics and Smart Structures

Basics,
Materials, Design,
and Applications

Hartmut Janocha
Editor



Springer

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Vinod K. Wadhawan



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Adaptronics and Smart Structures Hartmut Janocha, 2013-11-11 Adaptronics is the term encompassing technical fields that have become known internationally under the names smart materials intelligent structures and smart structures Adaptronics contributes to the optimisation of systems and products It bridges the gap between material and system or product and incorporates the search for multi functional materials and elements and their integration in systems or structures The authors of this book have taken on the task of displaying the current state of the art in this fascinating field The system components actuators sensors and controllers technical fundamentals materials design rules and practical solutions are all described Selected sample applications are also presented and current development trends are demonstrated *Adaptronics - Smart Structures and Materials* Johannes Michael Sinapius, 2020-08-24 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 **Adaptronics and Smart Structures** H. Janocha, 1999 *Smart Structures* Vinod K. Wadhawan, 2007-10-18 Smartness is often associated with living beings as they can adapt themselves to changing situations Artificial smart structures are designed to mimic biological structures to a small or large extent This book gives a comprehensive account of how this can be done It will be of interest to students and professionals in science and engineering *Advances in Ergonomics in Design* Francisco Rebelo, Marcelo Soares, 2017-06-22 This book provides readers with a timely snapshot of ergonomics research and methods applied to the design development and prototyping as well as the evaluation training and manufacturing of products systems and services Combining theoretical contributions case studies and reports on technical interventions it covers a wide range of topics in ergonomic design including ecological design educational and game design cultural and ethical aspects in design user

research and human computer interaction in design as well as design for accessibility and extreme environments and many others The book places special emphasis on new technologies such as virtual reality state of the art methodologies in information design and human computer interfaces Based on the AHFE 2017 International Conference on Ergonomics in Design held on July 17-21, 2017 in Los Angeles, California, USA, the book offers a timely guide for both researchers and design practitioners including industrial designers, human computer interaction and user experience researchers, production engineers and applied psychologists

Intelligent Envelopes for High-Performance Buildings Guedi Capeluto, Carlos Ernesto Ochoa, 2016-11-09 This book presents a series of significant methods and examples for the design of sustainable intelligent facades in a variety of contexts Emphasis is placed on how intelligence has been applied for successful energy saving efforts in the planning of building envelopes Readers will find essential information on the core principles involved in designing, calculating and organizing intelligent facades according to the need for a new or retrofitted building Not only are different materials and technologies considered but also efficient ways to combine them according to user needs and other project specific constraints Illustrations, tables and graphs accompany the text clarifying the concepts discussed Architects, facade consultants and all those interested in energy saving measures and improved indoor comfort will find this book useful not only as an introduction to the subject but also as a guide to achieving more responsive building methods

Intelligent Materials and Structures Haim Abramovich, 2016-09-12 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

Robotic Systems for Handling and Assembly Daniel Schütz, Friedrich Wahl, 2010-11-30 Although parallel robots are known to offer many advantages with respect to accuracy, dynamics and stiffness, major breakthroughs in industrial applications have not yet taken place This is due to a knowledge gap preventing fast and precise execution of industrial handling and assembly tasks This book focuses on the design, modeling and control of innovative parallel structures as well as the integration of novel machine elements Special attention is paid to the integration of active components into lightweight links and passive joints In

addition new control concepts are introduced to minimize structural vibrations Although the optimization of robot systems itself allows a reduction of cycle times these can be further decreased by improved path planning robot programming and automated assembly planning concepts described by 25 contributions within this book The content of this volume is subdivided into four main parts dealing with Modeling and Design System Implementation Control and Programming as well as Adaptronics and Components This book is aimed at researchers and postgraduates working in the field of parallel robots as well as practicing engineers dealing with industrial robot development and robotic applications **Actuators** Hartmut Janocha,2013-03-09 Authored by a team of acknowledged experts this book presents a multidisciplinary view of the state of the art in the field of actuators The goal of the book is to provide a comprehensive overview of the properties applications and potential applications of traditional and unconventional actuators together with their corresponding power electronics Special attention is paid to the objective assessment of competing actuator principles The book is written primarily for designers and engineers in research and development but will also be valuable as a textbook for students of automation engineering mechatronics and adaptronics **Smart Structures and Materials** ,2005

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