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Basic Mechanics with Engineering Applications *Engineering Applications for New Materials and Technologies* **Optimal Control with Engineering Applications** *Coastal Processes with Engineering Applications* **Fast Radial Basis Functions for Engineering Applications** *Deep Learning in Gaming and Animations* *Handbook of Materials Selection for Engineering Applications* **Artificial Neural Networks for Engineering Applications** **Failure Analysis in Engineering Applications** **Lattice Boltzmann Modeling of Complex Flows for Engineering Applications** **Nonlinear Approaches in Engineering Applications** *Physics for Engineering Applications* **Engineering Applications of Nanotechnology** **Engineering Applications of Composites** **Sterile Pharmaceutical Products** **Unified Plasticity for Engineering Applications** *Engineering Applications of Biochar* **Nonlinear Optimization with Engineering Applications** **Selecting**

Thermoplastics for Engineering Applications **Big Data in Engineering Applications**
Engineering Applications of Soft Computing **Python 3 for Science and Engineering**
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with Engineering Applications *Statistical Design of Experiments with Engineering*
Applications **Statistics and Probability for Engineering Applications** *Fibrous and*
Composite Materials for Civil Engineering Applications **Engineering Applications of**
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Prototyping and Engineering Applications **Thermoset Nanocomposites for**
Engineering Applications *Electronics and Communications Engineering* **Dynamics of**
Soils and Their Engineering Applications Biomedical Foams for Tissue Engineering
Applications **Engineering Applications of Pneumatics and Hydraulics** **Adaptive**
Structures **Introduction to Simulink with Engineering Applications** *Evolutionary*
Algorithms in Engineering Applications Parallel Science and Engineering Applications
Solar Energy Sciences and Engineering Applications

Adaptive structures have the ability to adapt, evolve or change their properties or behaviour in response to the environment around them. The analysis and design of adaptive structures requires a highly multi-disciplinary approach which includes elements of structures, materials, dynamics, control, design and inspiration taken from biological systems. Development of adaptive structures has been taking place in a wide range of industrial

applications, but is particularly advanced in the aerospace and space technology sector with morphing wings, deployable space structures; piezoelectric devices and vibration control of tall buildings. Bringing together some of the foremost world experts in adaptive structures, this unique text: includes discussions of the application of adaptive structures in the aerospace, military, civil engineering structures, automotive and MEMS. presents the impact of biological inspiration in designing adaptive structures, particularly the use of hierarchy in nature, which typically induces multi-functional behavior. sets the agenda for future research in adaptive structures in one distinctive single volume. Adaptive Structures: Engineering Applications is essential reading for engineers and scientists working in the fields of intelligent materials, structural vibration, control and related smart technologies. It will also be of interest to senior undergraduate and postgraduate research students as well as design engineers working in the aerospace, mechanical, electrical and civil engineering sectors. This book gives a sufficient grounding in mechanics for engineers to tackle a significant range of problems encountered in the design and specification of simple structures and machines. It also provides an excellent background for students wishing to progress to more advanced studies in three-dimensional mechanics. This book presents the current trends, technologies, and challenges in Big Data in the diversified field of engineering and sciences. It covers the applications of Big Data ranging from conventional fields of mechanical engineering, civil engineering to electronics, electrical, and computer

science to areas in pharmaceutical and biological sciences. This book consists of contributions from various authors from all sectors of academia and industries, demonstrating the imperative application of Big Data for the decision-making process in sectors where the volume, variety, and velocity of information keep increasing. The book is a useful reference for graduate students, researchers and scientists interested in exploring the potential of Big Data in the application of engineering areas. Thermoset nanocomposites represent a new technology solution. These new formulations benefit from improved dimensional/thermal stability, flame retardancy and chemical resistance; and have potential applications in marine, industrial and construction markets. This book helps to answer questions related to the design of nanocomposites by controlling the processing technology and structure. The book is addressed not only to researchers and engineers who actively work in the broad field of nanocomposite technology, but also to newcomers and students who have just started investigations in this mul. This book focuses on the latest applications of nonlinear approaches in engineering and addresses a range of scientific problems. Examples focus on issues in automotive technology, including automotive dynamics, control for electric and hybrid vehicles, and autodriver algorithm for autonomous vehicles. Also included are discussions on renewable energy plants, data modeling, driver-aid methods, and low-frequency vibration. Chapters are based on invited contributions from world-class experts who advance the future of engineering by discussing the development

of more optimal, accurate, efficient, cost, and energy effective systems. This book is appropriate for researchers, students, and practising engineers who are interested in the applications of nonlinear approaches to solving engineering and science problems. Presents a broad range of practical topics and approaches; Explains approaches to better, safer, and cheaper systems; Emphasises automotive applications, physical meaning, and methodologies. Solar energy is available all over the world in different intensities. Theoretically, the solar energy available on the surface of the earth is enough to support the energy requirements of the entire planet. However, in reality, progress and development of solar science and technology depends to a large extent on human desires and needs. This is due to the various barriers to overcome and to deal with the economics of practical utilization of solar energy. This book introduces the rapid development and progress in the field of solar energy applications for science and technology: the advancement in the field of biological processes & chemical processes; electricity production; and mechanical operations & building operations enhanced by solar energy. The volume covers bio-hydrogen production and other biological processes related to solar energy; chemical processes for the production of hydrogen from water and other endothermic processes using solar energy; the development of thermo-electric production through solar energy; the development of solar ponds for electric energy production; and the mechanical operation with solar energy; the building operation with solar energy optimization and urban

planning. This book is an invaluable resource for scientists who need the scientific and technological knowledge of the wide coverage of solar energy sciences and engineering applications. This will further encourage researchers, scientists, engineers and students to stimulate the use of solar energy as an alternative energy source. Developed in the context of science and engineering applications, with each abstraction motivated by and further honed by specific application needs, Charm++ is a production-quality system that runs on almost all parallel computers available. Parallel Science and Engineering Applications: The Charm++ Approach surveys a diverse and scalable collecti Failure Analysis in Engineering Applications deals with equipment and machine design together with examples of failures and countermeasures to avoid such failures. This book analyzes failures in facilities or structures and the ways to prevent them from happening in the future. The author describes conventional terms associated with failure or states of failure including the strength of materials, as well as the procedure in failure analysis (materials used, design stress, service conditions, simulation, examination of results). The author also describes the mechanism of fatigue failure and prediction methods to estimate the remaining life of affected structures. The author cites some precautions to be followed in actual failure analysis such as detailed observation on the fracture site, removal of surface deposits (for example, rusts) without altering the fracture size or shape, The book gives examples of analysis of failure involving a crane head sheave hanger, wire rope, transmission shaft, environmental failure of

fastening screws, and failures in rail joints. This book is intended for civil and industrial engineers, for technical designers or engineers involved in the maintenance of equipment, machineries, and structures. This book has included the following major sections: "Introduction", "History of Biochar," "Preparation of Biochar," and "Applications of Biochar." The editor and authors hope that the development of biochar can cross its application field from agriculture into engineering. Biomedical foams are a new class of material which is increasingly being used for tissue engineering applications. The structure of biomedical foams makes the materials lightweight but strong, ideal for bone tissue regeneration. In addition the rough surfaces encourage tissue growth which can further improve the strength of the implant. This book provides readers with a comprehensive review of biomedical foams. Chapter contributors discuss the fundamentals of biomedical foams such as properties, structure and materials and review tissue engineering applications of biomedical foams. Statistics and Probability for Engineering Applications provides a complete discussion of all the major topics typically covered in a college engineering statistics course. This textbook minimizes the derivations and mathematical theory, focusing instead on the information and techniques most needed and used in engineering applications. It is filled with practical techniques directly applicable on the job. Written by an experienced industry engineer and statistics professor, this book makes learning statistical methods easier for today's student. This book can be read sequentially like a

normal textbook, but it is designed to be used as a handbook, pointing the reader to the topics and sections pertinent to a particular type of statistical problem. Each new concept is clearly and briefly described, whenever possible by relating it to previous topics. Then the student is given carefully chosen examples to deepen understanding of the basic ideas and how they are applied in engineering. The examples and case studies are taken from real-world engineering problems and use real data. A number of practice problems are provided for each section, with answers in the back for selected problems. This book will appeal to engineers in the entire engineering spectrum (electronics/electrical, mechanical, chemical, and civil engineering); engineering students and students taking computer science/computer engineering graduate courses; scientists needing to use applied statistical methods; and engineering technicians and technologists. * Filled with practical techniques directly applicable on the job * Contains hundreds of solved problems and case studies, using real data sets * Avoids unnecessary theory

Composite Materials, Volume 3: Engineering Applications of Composites covers a variety of applications of both low- and high-cost composite materials in a number of business sectors, including material systems used in the electrical and nuclear industries. The book discusses the utilization of carbon-fiber reinforced plastics for a number of high-volume products; applications in road transportation; and the application of composite materials to civil aircraft structures. The text also describes the engineering considerations that enter into the selection and

application of materials, as well as the composite applications in existing spacecraft hardware and includes projected applications for space vehicles and systems. The application of materials to military aircraft structure; the components applicable to personal and mass-transit vehicles; and composites in the ocean engineering industry are also considered. The book further tackles composite materials or composite structures principally found in buildings; composite uses in the chemical industries; and examples of fiber-glass-reinforced plastic components in key end-product markets. The text also looks into the most commonly employed molding techniques, mechanical and physical properties of various fiber glass-reinforced thermosets and thermoplastics, the resins and fiber-glass reinforcements available, and code information. The chemical, physical, and mechanical properties and application information about composites in the electrical and nuclear industries; and the potential high-volume applications of advanced composites are also encompassed. Engineers and people involved in the development of composite materials will find the book invaluable.

Sterile Pharmaceutical Products: Process Engineering Applications addresses the key concepts and applications of the sterile pharmaceutical manufacturing industry. It covers elements of the design, installation, validation, and usage of critical processes associated with sterile product manufacture. From water systems to clean-in-place systems, to sterile powder handling and robotic applications in sterile production environments, this book addresses the issues of system implementation,

integration, and operations. Written by recognized experts and peer reviewed for accuracy, all chapters include references to supplemental resources and numerous illustrations. Engineering systems are highly distributed collective systems that have humans in the loop. Engineering systems emphasize the potential of control and games beyond traditional applications. Game theory can be used to design incentives to obtain socially desirable behaviors on the part of the players, for example, a change in the consumption patterns on the part of the "prosumers" (producers-consumers) or better redistribution of traffic. This unique book addresses the foundations of game theory, with an emphasis on the physical intuition behind the concepts, an analysis of design techniques, and a discussion of new trends in the study of cooperation and competition in large complex distributed systems. Evolutionary algorithms are general-purpose search procedures based on the mechanisms of natural selection and population genetics. They are appealing because they are simple, easy to interface, and easy to extend. This volume is concerned with applications of evolutionary algorithms and associated strategies in engineering. It will be useful for engineers, designers, developers, and researchers in any scientific discipline interested in the applications of evolutionary algorithms. The volume consists of five parts, each with four or five chapters. The topics are chosen to emphasize application areas in different fields of engineering. Each chapter can be used for self-study or as a reference by practitioners to help them apply evolutionary algorithms to problems in their engineering domains. This

concise survey describes the requirements on materials operating in high-temperature environments and the processes that increase the temperature capability of metals, ceramics, and composites. The major part deals with the applicable materials and their specific properties, with one entire chapter devoted to coatings. Written for engineering and science students, researchers, and managers in industry. This book introduces a variety of problem statements in classical optimal control, in optimal estimation and filtering, and in optimal control problems with non-scalar-valued performance criteria. Many example problems are solved completely in the body of the text. All chapter-end exercises are sketched in the appendix. The theoretical part of the book is based on the calculus of variations, so the exposition is very transparent and requires little mathematical rigor. Reflecting the rapid advances in new materials development, this work offers up-to-date information on the properties and applications of various classes of metals, polymers, ceramics and composites. It aims to simplify the materials selection process and show how to lower materials and manufacturing costs, drawing on such sources as vendor supplied and quality control test data. Nature continuously presents a huge number of complex and multi-scale phenomena, which in many cases, involve the presence of one or more fluids flowing, merging and evolving around us. Since its appearance on the surface of Earth, Mankind has tried to exploit and tame fluids for their purposes, probably starting with Hero's machinery to open the doors of the Temple of Serapis in Alexandria to arrive to modern propulsion systems

and actuators. Today we know that fluid mechanics lies at the basis of countless scientific and technical applications from the smallest physical scales (nanofluidics, bacterial motility, and diffusive flows in porous media), to the largest (from energy production in power plants to oceanography and meteorology). It is essential to deepen the understanding of fluid behaviour across scales for the progress of Mankind and for a more sustainable and efficient future. Since the very first years of the Third Millennium, the Lattice Boltzmann Method (LBM) has seen an exponential growth of applications, especially in the fields connected with the simulation of complex and soft matter flows. LBM, in fact, has shown a remarkable versatility in different fields of applications from nanoactive materials, free surface flows, and multiphase and reactive flows to the simulation of the processes inside engines and fluid machinery. LBM is based on an optimized formulation of Boltzmann's Kinetic Equation, which allows for the simulation of fluid particles, or rather quasi-particles, from a mesoscopic point of view thus allowing the inclusion of more fundamental physical interactions in respect to the standard schemes adopted with Navier-Stokes solvers, based on the continuum assumption. In this book, the authors present the most recent advances of the application of the LBM to complex flow phenomena of scientific and technical interest with particular focus on the multi-scale modeling of heterogeneous catalysis within nano-porous media and multiphase, multicomponent flows. This book discusses the expertise, skills, and techniques needed for the development of new materials

and technologies. It focuses on finite element and finite volume methods that are used for engineering simulations, and present many state-of-the-art applications and advances to highlight these methods' importance. For example, modern joining technologies can be used to fabricate new compound or composite materials, even those formed from dissimilar component materials. These composite materials are often exposed to harsh environments, must deliver specific characteristics, and are primarily used in automotive and marine technologies, i.e., ships, amphibious vehicles, docks, offshore structures, and even robots. To achieve the desired material performance, computer-based engineering tools are widely used for simulation, data evaluation, and design processes. More quality, more flexibility, and less costs seem to be the key to meeting the demands of the global marketplace. The secret to success in this arena lies in the expert execution of the critical tasks in the product definition stage. Prototyping is an essential part of this stage, yet can be very expensive. It must be planned well and use state-o

This book constitutes the refereed proceedings of the 18th International Conference on Engineering Applications of Neural Networks, EANN 2017, held in Athens, Greece, in August 2017. The 40 revised full papers and 5 revised short papers presented were carefully reviewed and selected from 83 submissions. The papers cover the topics of deep learning, convolutional neural networks, image processing, pattern recognition, recommendation systems, machine learning, and applications of Artificial Neural Networks (ANN) applications in engineering, 5G telecommunication

networks, and audio signal processing. The volume also includes papers presented at the 6th Mining Humanistic Data Workshop (MHDW 2017) and the 2nd Workshop on 5G-Putting Intelligence to the Network Edge (5G-PINE). Considerably simplified models of macroscopic material behavior, such as the idealization for metals of elastic-time independent plastic response with a yield (onset) criterion, have served the engineering profession well for many years. They are still basic to the design and analysis of most structural applications. In the need to use materials more effectively, there are circumstances where those traditional models are not adequate, and constitutive laws that are more physically realistic have to be employed. This is especially relevant to conditions where the inherent time dependence of inelastic deformations, referred to as "viscoplasticity", is pronounced such as at elevated temperatures and for high strain rates. Unified theories of elastic-viscoplastic material behavior, which are primarily applicable for metals and metallic alloys, combine all aspects of inelastic response into a set of time dependent equations with a single inelastic strain rate variable. For such theories, creep under constant stress, stress relaxation under constant strain, and stress-strain relations at constant rates are each special cases of a general formulation. Those equations may or may not include a yield criterion, but models which do not separate a fully elastic region from the overall response could be considered "unified" in a more general sense. The theories have reached a level of development and maturity where they are being used in a number of

sophisticated engineering applications. However, they have not yet become a standard method of material representation for general engineering practice. The PC has longtime outgrown its function as a pure computer and has become an all-purpose machine. This book is targeted towards those people that want to control existing or self-built hardware from their computer. Using Visual Basic as Rapid Application Development tool we will take you on a journey to unlock the world beyond the connectors of the PC. After familiarizing yourself with Visual Basic, its development environment and the toolset it offers, items such as serial communications, printer ports, bitbanging, protocol emulation, ISA, USB and Ethernet interfacing and the remote control of test-equipment over the GPIB bus are covered in extent. Each topic is accompanied by clear, ready to run code, and where necessary, schematics are provided that will get your project up to speed in no time. This book will show you advanced things like: using tools like Debug to find hardware addresses, setting up remote communication using TCP/IP and UDP sockets and even writing your own internet servers. Or how about connecting your own block of hardware over USB or Ethernet and controlling it from Visual Basic. Other things like inter-program communication, DDE and the new graphics interface of Windows XP are covered as well. All examples are ready to compile using Visual Basic 5.0, 6.0, NET or 2005. Extensive coverage is given on the differences between what could be called Visual Basic Classic and Visual Basic NET / 2005. Text on coastal engineering and oceanography covering theory

and applications intended to mitigate shoreline erosion. In today's high-technology world, with flourishing e-business and intense competition at a global level, the search for the competitive advantage has become a crucial task of corporate executives. Quality, formerly considered a secondary expense, is now universally recognized as a necessary tool. Although many statistical methods are available for determining quality, there has been no guide to easy learning and implementation until now. Filling that gap, *Statistical Design of Experiments with Engineering Applications*, provides a ready made, quick and easy-to-learn approach for applying design of experiments techniques to problems. The book uses quality as the main theme to explain various design of experiments concepts. The authors examine the entire product lifecycle and the tools and techniques necessary to measure quality at each stage. They explain topics such as optimization, Taguchi's method, variance reduction, and graphical applications based on statistical techniques. Wherever applicable the book supplies practical rules of thumb, step-wise procedures that allow you to grasp concepts quickly and apply them appropriately, and examples that demonstrate how to apply techniques. Emphasizing the importance of quality to products and services, the authors include concepts from the field of Quality Engineering. Written with an emphasis on application and not on bogging you down with the theoretical underpinnings, the book enables you to solve 80% of design problems without worrying about the derivation of mathematical formulas. Over the last decade, progress in deep learning has had a profound

and transformational effect on many complex problems, including speech recognition, machine translation, natural language understanding, and computer vision. As a result, computers can now achieve human-competitive performance in a wide range of perception and recognition tasks. Many of these systems are now available to the programmer via a range of so-called cognitive services. More recently, deep reinforcement learning has achieved ground-breaking success in several complex challenges. This book makes an enormous contribution to this beautiful, vibrant area of study: an area that is developing rapidly both in breadth and depth. Deep learning can cope with a broader range of tasks (and perform those tasks to increasing levels of excellence). This book lays a good foundation for the core concepts and principles of deep learning in gaming and animation, walking you through the fundamental ideas with expert ease. This book progresses in a step-by-step manner. It reinforces theory with a full-fledged pedagogy designed to enhance students' understanding and offer them a practical insight into its applications. Also, some chapters introduce and cover novel ideas about how artificial intelligence (AI), deep learning, and machine learning have changed the world in gaming and animation. It gives us the idea that AI can also be applied in gaming, and there are limited textbooks in this area. This book comprehensively addresses all the aspects of AI and deep learning in gaming. Also, each chapter follows a similar structure so that students, teachers, and industry experts can orientate themselves within the text. There are few books in the field of gaming using

AI. Deep Learning in Gaming and Animations teaches you how to apply the power of deep learning to build complex reasoning tasks. After being exposed to the foundations of machine and deep learning, you will use Python to build a bot and then teach it the game's rules. This book also focuses on how different technologies have revolutionized gaming and animation with various illustrations. This textbook examines a broad range of problems in science and engineering, describing key numerical methods applied to real life. The case studies presented are in such areas as data fitting, vehicle route planning and optimal control, scheduling and resource allocation, sensitivity calculations and worst-case analysis. Chapters are self-contained with exercises provided at the end of most sections. Nonlinear Optimization with Engineering Applications is ideal for self-study and classroom use in engineering courses at the senior undergraduate or graduate level. The book will also appeal to postdocs and advanced researchers interested in the development and use of optimization algorithms. The book offers systematic dynamic analysis of soils and their engineering applications, including machine foundations, and aims to develop a clear understanding of the subject. It comprises sixteen chapters. Chapter 1 introduces the reader to the various problems in soil dynamics. In Chapter 2, concepts of theory of vibrations are discussed along with their applications in designing Vibration Absorbers and Pickups. Wave propagation in elastic medium including wave refraction in layered medium is covered in Chapter 3. Chapter 4 deals with the procedure of determining dynamic properties of soils

using various laboratory and field tests. Dynamic earth pressures in retaining walls and dynamic bearing capacity of footings are dealt with in Chapters 5 and 6 respectively. Chapters 7 and 8 respectively deal with dynamic behavior of pile foundations and slopes. Causes of liquefaction of soils and prediction of liquefaction potential have been discussed in Chapter 9. In Chapter 10, the procedure of estimating the unbalanced forces in various types of machines are covered. Chapters 11, 12 and 13 deal with the analysis and design of foundations of reciprocating machine, hammer, and turbo-generators respectively. In Chapter 14, problems of vibration isolation and screening are dealt with. Chapter 15 discusses the analysis and design of reinforced earth wall located in seismic areas. A new concept of a conventional rigid retaining wall having reinforced backfill is presented in Chapter 16, giving complete analysis and design procedure considering seismic forces. Physics for Engineering Applications introduces the fundamental concepts pertaining to important sub-fields of physics, namely, Waves, Optics, Electromagnetics, Quantum Mechanics, Radiation Physics and Solid-State Physics. Besides, the technologically important topics of Quantum Computing, Nano Materials, and Radiation detectors and shielding materials, are introduced for undergraduate students in a simple and self explanatory manner. This textbook will be useful for B.E. / B.Tech. students taking up Applied Physics course, as well as those appearing for GATE exams and A.M.I.E. Students. The use of fibrous materials in civil engineering, both as structural reinforcement and in

non-structural applications such as geotextiles, is an important and interesting development. Fibrous and composite materials for civil engineering applications analyses the types and properties of fibrous textile and structures and their applications in reinforcement and civil engineering. Part one introduces different types of fibrous textiles and structures. Chapters cover the properties of natural and man-made fibres and of yarns, as well as an overview of textile structures. Part two focuses on fibrous material use in concrete reinforcement, with chapters on the properties and applications of steel fibre reinforced concrete, natural fibre reinforced concrete and the role of fibre reinforcement in mitigating shrinkage cracks. In part three, the applications of fibrous material-based composites in civil engineering are covered. Chapters concentrate on production techniques and applications such as reinforcement of internal structures, structural health monitoring and textile materials in architectural membranes. With its distinguished editor and international team of contributors, Fibrous and composite materials for civil engineering applications is a standard reference for fabric and composite manufacturers, civil engineers and professionals, as well as academics with a research interest in this field. Explores the development of fibrous materials in civil engineering, both as structural reinforcement and in non-structural applications such as geotextiles Key topics include short fibre reinforced concrete, natural fibre reinforced concrete and high performance fibre reinforced cementitious composites A standard reference for fabric and composite manufacturers, civil

engineers and professionals, as well as academics with a research interest in this field. This text is an introduction to Simulink, a companion application to MATLAB. It is written for students at the undergraduate and graduate programs, as well as for the working professional. Although some previous knowledge of MATLAB would be helpful, it is not absolutely necessary; Appendix A of this text is an Introduction to MATLAB to enable the reader to begin learning both MATLAB and Simulink to perform graphical computations and programming. Chapters 2 through 18 describe the blocks of all Simulink libraries. Their application is illustrated with practical examples through Simulink models, some of which are supplemented with MATLAB functions, commands, and statements. Chapters 1 and 19 contain several Simulink models to illustrate various applied math and engineering applications. Appendix B is an introduction to difference equations as they apply to discrete-time systems, and Appendix C introduces the reader to random generation procedures. This text supplements our Numerical Analysis with MATLAB and Spreadsheet Applications, ISBN 0-9709511-1-6. It is self-contained; the blocks of each library are described in an orderly fashion that is consistent with Simulink's documentation. This arrangement provides insight into how a model is used and how its parts interact with each other. Like MATLAB, Simulink can be used with both linear and nonlinear systems, which can be modeled in continuous time, sample time, or a hybrid of these. Examples are provided in this text. Most of the examples presented in this book can be implemented with

the Student Versions of MATLAB and Simulink. A few may require the full versions of these outstanding packages, and can be skipped. Some add-ons, known as Toolboxes and Blocksets can be obtained from The MathWorks, Inc., 3 Apple Hill Drive, Natick, MA 01760-2098, USA, www.mathworks.com. Every day, millions of people are unaware of the amazing processes that take place when using their phones, connecting to broadband internet, watching television, or even the most basic action of flipping on a light switch. Advances are being continually made in not only the transmission of this data but also in the new methods of receiving it. These advancements come from many different sources and from engineers who have engaged in research, design, development, and implementation of electronic equipment used in communications systems. This volume addresses a selection of important current advancements in the electronics and communications engineering fields, focusing on signal processing, chip design, and networking technology. The sections in the book cover: Microwave and antennas Communications systems Very large-scale integration Embedded systems Intelligent control and signal processing systems This book focuses on the use of nanotechnology in several fields of engineering. Among others, the reader will find valuable information as to how nanotechnology can aid in extending the life of component materials exposed to corrosive atmospheres, in thermal fluid energy conversion processes, anti-reflection coatings on photovoltaic cells to yield enhanced output from solar cells, in connection with friction and wear reduction in automobiles, and buoyancy

suppression in free convective heat transfer. Moreover, this unique resource presents the latest research on nanoscale transport phenomena and concludes with a look at likely future trends. This book bridges the gap between Soft Computing techniques and their applications to complex engineering problems. In each chapter we endeavor to explain the basic ideas behind the proposed applications in an accessible format for readers who may not possess a background in some of the fields. Therefore, engineers or practitioners who are not familiar with Soft Computing methods will appreciate that the techniques discussed go beyond simple theoretical tools, since they have been adapted to solve significant problems that commonly arise in such areas. At the same time, the book will show members of the Soft Computing community how engineering problems are now being solved and handled with the help of intelligent approaches. Highlighting new applications and implementations of Soft Computing approaches in various engineering contexts, the book is divided into 12 chapters. Further, it has been structured so that each chapter can be read independently of the others. This book presents the first “How To” guide to the use of radial basis functions (RBF). It provides a clear vision of their potential, an overview of ready-for-use computational tools and precise guidelines to implement new engineering applications of RBF. Radial basis functions (RBF) are a mathematical tool mature enough for useful engineering applications. Their mathematical foundation is well established and the tool has proven to be effective in many fields, as the mathematical framework can be adapted in

several ways. A candidate application can be faced considering the features of RBF: multidimensional space (including 2D and 3D), numerous radial functions available, global and compact support, interpolation/regression. This great flexibility makes RBF attractive – and their great potential has only been partially discovered. This is because of the difficulty in taking a first step toward RBF as they are not commonly part of engineers’ cultural background, but also due to the numerical complexity of RBF problems that scales up very quickly with the number of RBF centers. Fast RBF algorithms are available to alleviate this and high-performance computing (HPC) can provide further aid. Nevertheless, a consolidated tradition in using RBF in engineering applications is still missing and the beginner can be confused by the literature, which in many cases is presented with language and symbolisms familiar to mathematicians but which can be cryptic for engineers. The book is divided in two main sections. The first covers the foundations of RBF, the tools available for their quick implementation and guidelines for facing new challenges; the second part is a collection of practical RBF applications in engineering, covering several topics, including response surface interpolation in n-dimensional spaces, mapping of magnetic loads, mapping of pressure loads, up-scaling of flow fields, stress/strain analysis by experimental displacement fields, implicit surfaces, mesh to cad deformation, mesh morphing for crack propagation in 3D, ice and snow accretion using computational fluid dynamics (CFD) data, shape optimization for external aerodynamics, and use of adjoint data

for surface sculpting. For each application, the complete path is clearly and consistently exposed using the systematic approach defined in the first section. Artificial Neural Networks for Engineering Applications presents current trends for the solution of complex engineering problems that cannot be solved through conventional methods. The proposed methodologies can be applied to modeling, pattern recognition, classification, forecasting, estimation, and more. Readers will find different methodologies to solve various problems, including complex nonlinear systems, cellular computational networks, waste water treatment, attack detection on cyber-physical systems, control of UAVs, biomechanical and biomedical systems, time series forecasting, biofuels, and more. Besides the real-time implementations, the book contains all the theory required to use the proposed methodologies for different applications. Presents the current trends for the solution of complex engineering problems that cannot be solved through conventional methods Includes real-life scenarios where a wide range of artificial neural network architectures can be used to solve the problems encountered in engineering Contains all the theory required to use the proposed methodologies for different applications Assuming only the most basic knowledge of the physics of fluids, this book aims to equip the reader with a sound understanding of fluid power systems and their uses in practical engineering. In line with the strongly practical bias of the book, maintenance and trouble-shooting are covered, with particular emphasis on safety systems and regulations.

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