Visual attention is a relatively new area of study combining a number of disciplines: artificial neural networks, artificial intelligence, vision science and psychology. The aim is to build computational models similar to human vision in order to solve tough problems for many potential applications including object recognition, unmanned vehicle navigation, and image and video coding and processing. In this book, the authors provide an up to date and highly applied introduction to the topic of visual attention, aiding researchers in creating powerful computer vision systems. Areas covered include the significance of vision research, psychology and computer vision, existing computational visual attention models, and the authors' contributions on visual attention models, and applications in various image and video processing tasks. This book is geared for graduates students and researchers in neural networks, image processing, machine learning, computer vision, and other areas of biologically inspired model building and applications. The book can also be used by practicing engineers looking for techniques involving the application of image coding, video processing, machine vision and brain-like robots to real-world
systems. Other students and researchers with interdisciplinary interests will also find this book appealing. Provides a key knowledge boost to developers of image processing applications Is unique in emphasizing the practical utility of attention mechanisms Includes a number of real-world examples that readers can implement in their own work: robot navigation and object selection image and video quality assessment image and video coding Provides codes for users to apply in practical attentional models and mechanisms

**Computational Blood Cell Mechanics**

Trends in Computational Nanomechanics reviews recent advances in analytical and computational modeling frameworks to describe the mechanics of materials on scales ranging from the atomistic, through the microstructure or transitional, and up to the continuum. The book presents new approaches in the theory of nanosystems, recent developments in theoretical and computational methods for studying problems in which multiple length and/or time scales must be simultaneously resolved, as well as example applications in nanomechanics. This title will be a useful tool of reference for professionals, graduates and undergraduates interested in Computational Chemistry and Physics, Materials Science, Nanotechnology.

**Mathematical and Computational Modeling**

Unique in its comprehensive coverage of not only theoretical methods but also applications in computational spectroscopy, this ready reference and handbook compiles the developments made over the last few years, from single molecule studies to the simulation of clusters and the solid state, from organic molecules to complex inorganic systems and from basic research to commercial applications in the area of environment relevance. In so doing, it covers a multitude of apparatus-driven technologies, starting with the common and traditional spectroscopic methods, more recent developments (THz), as well as rather unusual methodologies and systems, such as the prediction of parity violation, rare gas HI complexes or theoretical spectroscopy of the transition state. With its summarized results of so many different disciplines, this timely book will be of interest to newcomers to this hot topic while equally informing experts about developments in neighboring fields.

**Computational Immunology**

This book provides innovative chapters covering new methodologies and important applications in the fields of nanoscience and computational chemistry. The book offers scope for academics, researchers, and engineering professionals to present their research and development works that have potential for applications in several disciplines of nano and computational chemistry. Contributions range from new methods to novel applications of existing methods to help readers gain an
understanding of the material and/or structural behavior of new and advanced systems. This book is a high quality tool for researchers, providing an overview of the field, explaining the basic underlying theory at a meaningful level, and giving numerous comparisons of different methods.

**3D Bioprinting and Nanotechnology in Tissue Engineering and Regenerative Medicine**

This unique volume presents the state of the art in the field of multiscale modeling in solid mechanics, with particular emphasis on computational approaches. For the first time, contributions from both leading experts in the field and younger promising researchers are combined to give a comprehensive description of the recently proposed techniques and the engineering problems tackled using these techniques. The book begins with a detailed introduction to the theories on which different multiscale approaches are based, with regards to linear Homogenisation as well as various nonlinear approaches. It then presents advanced applications of multiscale approaches applied to nonlinear mechanical problems. Finally, the novel topic of materials with self-similar structure is discussed. Sample Chapter(s). Chapter 1: Computational Homogenisation for Non-Linear Heterogeneous Solids (V G Kouznetsova et al.); Two-Scale Asymptotic Homogenisation-Based Finite Element Analysis of Composite Materials (Q-Z Xiao & B L Karihaloo); Multi-Scale Boundary Element Modelling of Material Degradation and Fracture (G K Sfantos & M H Aliabadi); Non-Uniform Transformation Field Analysis: A Reduced Model for Multiscale Non-Linear Problems in Solid Mechanics (J-C Michel & P Suquet); Multiscale Approach for the Thermomechanical Analysis of Hierarchical Structures (M J Lefik et al.); Recent Advances in Masonry Modelling: Micro-Modelling and Homogenisation (P B Louren o); Mechanics of Materials with Self-Similar Hierarchical Microstructure (R C Picu & M A Soare). Readership: Researchers and academics in the field of heterogeneous materials and mechanical engineering; professionals in aeronautical engineering and materials science.

**Computational Modeling of Drugs Against Alzheimer’s Disease**

This book introduces the key concepts of nanoscale spectroscopy methods used in nanotechnologies in a manner that is easily digestible for a beginner in the field. It discusses future applications of nanotechnologies in technical industries. It also covers new developments and interdisciplinary research in engineering, science, and medicine. An overview of nanoscale spectroscopy for nanotechnologies, the book describes the technologies with an emphasis on how they work and on their key benefits. It also serves as a reference for veterans in the field.

**Nanoscale Spectroscopy with Applications**
This textbook, aimed at advanced undergraduate and graduate students, introduces the basic knowledge required for nanomedicine and nanotechnology, and emphasizes how the combined use of chemistry and light with nanoparticles can serve as treatments and therapies for cancer. This includes nanodevices, nanophototherapies, nanodrug design, and laser heating of nanoparticles and cell organelles. In addition, the book covers the emerging fields of nanophotonics and nanoplasmonics, which deal with nanoscale confinement of radiation and optical interactions on a scale much smaller than the wavelength of the light. The applications of nanophotonics and nanoplasmonics to biomedical research discussed in the book range from optical biosensing to photodynamic therapies.

Cutting-edge and reflective of the multidisciplinary nature of nanomedicine, this book effectively combines knowledge and modeling from nanoscience, medicine, biotechnology, physics, optics, engineering, and pharmacy in an easily digestible format. Among the topics covered in-depth are:

• The structure of cancer cells and their properties, as well as techniques for selective targeting of cancer and gene therapy.
• Nanoplasmonics: Lorentz-Mie simulations of optical properties of nanoparticles and the use of plasmonic nanoparticles in diagnosis and therapy.
• Nanophotonics: short and ultrashort laser pulse interactions with nanostructures, time and space simulations of thermal fields in and around the nanobioparticles, and nanoclusters heated by radiation.
• Modeling of soft and hard biological tissue ablation by activated nanoparticles, as well as optical, thermal, kinetic, and dynamic modeling.
• Detection techniques, including the design and methods of activation of nanodrugs and plasmon resonance detection techniques.
• Design and fabrication of nanorobots and nanoparticles.
• Effective implementation of nanotherapy treatments.
• Nanoheat transfer, particularly the heating and cooling kinetics of nanoparticles.
• and more! Each chapter contains a set of lectures in the form of text for student readers and PowerPoints for use by instructors, as well as homework exercises. Selected chapters also contain computer practicums, including Maple codes and worked-out examples. This book helps readers become more knowledgeable and versant in nanomedicine and nanotechnology, inspires readers to work creatively and go beyond the ideas and topics presented within, and is sufficiently comprehensive to be of value to research scientists as well as students.

Selective Visual Attention

This book explores applications of computational intelligence in key and emerging fields of engineering, especially with regard to condition monitoring and fault diagnosis, inverse problems, decision support systems and optimization. These applications can be beneficial in a broad range of contexts, including: water distribution networks, manufacturing systems, production and storage of electrical energy, heat transfer, acoustic levitation, uncertainty and robustness of infinite-dimensional objects, fatigue failure prediction, autonomous navigation, nanotechnology, and the analysis of technological development indexes. All applications, mathematical and computational tools, and original results are presented using rigorous mathematical procedures. Further, the book gathers contributions by respected experts from 22 different research centers and eight countries: Brazil, Cuba, France, Hungary, India, Japan, Romania and Spain. The book is intended for use in
graduate courses on applied computation, applied mathematics, and engineering, where tools like computational intelligence and numerical methods are applied to the solution of real-world problems in emerging areas of engineering.

**Advanced Computational Materials Modeling**

3D Bioprinting and Nanotechnology in Tissue Engineering provides an in depth introduction to these two technologies and their industrial applications. Stem cells in tissue regeneration are covered, along with nanobiomaterials. Commercialization, legal and regulatory considerations are also discussed in order to help you translate nanotechnology and 3D printing-based products to the marketplace and the clinic. Dr. Zhang’s and Dr. Fishers’ team of expert contributors have pooled their expertise in order to provide a summary of the suitability, sustainability and limitations of each technique for each specific application. The increasing availability and decreasing costs of nanotechnologies and 3D printing technologies are driving their use to meet medical needs, and this book provides an overview of these technologies and their integration. It shows how nanotechnology can increase the clinical efficiency of prosthesis or artificial tissues made by bioprinting or biofabrication. Students and professionals will receive a balanced assessment of relevant technology with theoretical foundation, while still learning about the newest printing techniques. Includes clinical applications, regulatory hurdles, and risk-benefit analysis of each technology. This book will assist you in selecting the best materials and identifying the right parameters for printing, plus incorporate cells and biologically active agents into a printed structure. Learn the advantages of integrating 3D printing and nanotechnology in order to improve the safety of your nano-scale materials for biomedical applications.

**Computational Intelligence in Emerging Technologies for Engineering Applications**

The book "Cognitive and Computational Neuroscience - Principles, Algorithms and Applications" will answer the following question and statements: System-level neural modeling: what and why? We know a lot about the brain! Need to integrate data: molecular/cellular/system levels. Complexity: need to abstract away higher-order principles. Models are tools to develop explicit theories, constrained by multiple levels (neural and behavioral). Key: models (should) make novel testable predictions on both neural and behavioral levels. Models are useful tools for guiding experiments. The hope is that the information provided in this book will trigger new researches that will help to connect basic neuroscience to clinical medicine.

**Computational Spectroscopy**

This volume presents recent research work focused in the development of adequate theoretical and numerical formulations
to describe the behavior of advanced engineering materials. Particular emphasis is devoted to applications in the fields of biological tissues, phase changing and porous materials, polymers and to micro/nano scale modeling. Sensitivity analysis, gradient and non-gradient based optimization procedures are involved in many of the chapters, aiming at the solution of constitutive inverse problems and parameter identification. All these relevant topics are exposed by experienced international and inter institutional research teams resulting in a high level compilation. The book is a valuable research reference for scientists, senior undergraduate and graduate students, as well as for engineers acting in the area of computational material modeling.

**Computational Intelligence and Its Applications**

Applications of nanotechnology continue to fuel significant innovations in areas ranging from electronics, microcomputing, and biotechnology to medicine, consumer supplies, aerospace, and energy production. As progress in nanoscale science and engineering leads to the continued development of advanced materials and new devices, improved methods of modeling and simulation are required to achieve a more robust quantitative understanding of matter at the nanoscale. Computational Nanotechnology: Modeling and Applications with MATLAB® provides expert insights into current and emerging methods, opportunities, and challenges associated with the computational techniques involved in nanoscale research. Written by, and for, those working in the interdisciplinary fields that comprise nanotechnology—including engineering, physics, chemistry, biology, and medicine—this book covers a broad spectrum of technical information, research ideas, and practical knowledge. It presents an introduction to computational methods in nanotechnology, including a closer look at the theory and modeling of two important nanoscale systems: molecular magnets and semiconductor quantum dots. Topics covered include: Modeling of nanoparticles and complex nano and MEMS systems Theory associated with micromagnetics Surface modeling of thin films Computational techniques used to validate hypotheses that may not be accessible through traditional experimentation Simulation methods for various nanotubes and modeling of carbon nanotube and silicon nanowire transistors In regard to applications of computational nanotechnology in biology, contributors describe tracking of nanoscale structures in cells, effects of various forces on cellular behavior, and use of protein-coated gold nanoparticles to better understand protein-associated nanomaterials. Emphasizing the importance of MATLAB for biological simulations in nanomedicine, this wide-ranging survey of computational nanotechnology concludes by discussing future directions in the field, highlighting the importance of the algorithms, modeling software, and computational tools in the development of efficient nanoscale systems.

**Computational Nanotechnology Using Finite Difference Time Domain**

Hybrid Computational Intelligence: Challenges and Utilities is a comprehensive resource that begins with the basics and
main components of computational intelligence. It brings together many different aspects of the current research on HCl
technologies, such as neural networks, support vector machines, fuzzy logic and evolutionary computation, while also
covering a wide range of applications and implementation issues, from pattern recognition and system modeling, to
intelligent control problems and biomedical applications. The book also explores the most widely used applications of hybrid
computation as well as the history of their development. Each individual methodology provides hybrid systems with
complementary reasoning and searching methods which allow the use of domain knowledge and empirical data to solve
complex problems. Provides insights into the latest research trends in hybrid intelligent algorithms and architectures
Focuses on the application of hybrid intelligent techniques for pattern mining and recognition, in big data analytics, and in
human-computer interaction Features hybrid intelligent applications in biomedical engineering and healthcare informatics

**Computational Approaches to Energy Materials**

This book is the result of a careful selection of contributors in the field of CFD. It is divided into three sections according to
the purpose and approaches used in the development of the contributions. The first section describes the "high-
performance computing" (HPC) tools and their impact on CFD modeling. The second section is dedicated to "CFD models for
local and large-scale industrial phenomena." Two types of approaches are basically contained here: one concerns the
adaptation from global to local scale, - e.g., the applications of CFD to study the climate changes and the adaptations to
local scale. The second approach, very challenging, is the multiscale analysis. The third section is devoted to "CFD in
numerical modeling approach for experimental cases." Its chapters emphasize on the numerical approach of the
mathematical models associated to few experimental (industrial) cases. Here, the impact and the importance of the
mathematical modeling in CFD are focused on. It is expected that the collection of these chapters will enrich the state of
the art in the CFD domain and its applications in a lot of fields. This collection proves that CFD is a highly interdisciplinary
research area, which lies at the interface of physics, engineering, applied mathematics, and computer science.

**Computational Materials Science**

With its discussion of strategies for modeling complex materials using new numerical techniques, mainly those based on
the finite element method, this monograph covers a range of topics including computational plasticity, multi-scale
formulations, optimization and parameter identification, damage mechanics and nonlinear finite elements.

**Computational Modeling, Optimization and Manufacturing Simulation of Advanced
Engineering Materials**
Computational Immunology: Applications focuses on different mathematical models, statistical tools, techniques, and computational modelling that helps in understanding complex phenomena of the immune system and its biological functions. The book also focuses on the latest developments in computational biology in designing of drugs, targets, biomarkers for early detection and prognosis of a disease. It highlights the applications of computational methods in deciphering the complex processes of the immune system and its role in health and disease. This book discusses the most essential topics, including Next generation sequencing (NGS) and computational immunology Computational modelling and biology of diseases Drug designing Computation and identification of biomarkers Application in organ transplantation Application in disease detection and therapy Computational methods and applications in understanding of the invertebrate immune system S Ghosh is MSc, PhD, PGDHE, PGDBI, is PhD from IICB, CSIR, Kolkata, awarded the prestigious National Scholarship from the Government of India. She has worked and published extensively in glycobiology, sialic acids, immunology, stem cells and nanotechnology. She has authored several publications that include books and encyclopedia chapters in reputed journals and books.

**Computational Nanophotonics**

Chemistry and chemical engineering have changed significantly in the last decade. They have broadened their scope into biology, nanotechnology, materials science, computation, and advanced methods of process systems engineering and control so much that the programs in most chemistry and chemical engineering departments now barely resemble the classical notion of chemistry. Beyond the Molecular Frontier brings together research, discovery, and invention across the entire spectrum of the chemical sciences from fundamental, molecular-level chemistry to large-scale chemical processing technology. This reflects the way the field has evolved, the synergy at universities between research and education in chemistry and chemical engineering, and the way chemists and chemical engineers work together in industry. The astonishing developments in science and engineering during the 20th century have made it possible to dream of new goals that might previously have been considered unthinkable. This book identifies the key opportunities and challenges for the chemical sciences, from basic research to societal needs and from terrorism defense to environmental protection, and it looks at the ways in which chemists and chemical engineers can work together to contribute to an improved future.

**Computational Bioengineering and Bioinformatics**

Computational Anatomical Animal Models: Methodological developments and research applications provides a comprehensive review of the history and technologies used for the development of computational small animal models with a focus on their application in preclinical imaging and experimental radiation therapy, as well as non-ionizing and ionizing radiation dosimetry calculations. It also provides an overview of the overall process involved in the design of these models,
including the fundamental elements used for the construction of different types of computational models, the identification of original anatomical data, the simulation tools used for solving various computational problems and the applications of computational animal models in preclinical research. Part of IPEM-IOP Series in Physics and Engineering in Medicine and Biology.

**Nanoscience and Computational Chemistry**

Computational Materials Science: An Introduction covers the essentials of computational science and explains how computational tools and techniques work to help solve materials science problems. The book focuses on two levels of a materials system: the electronic structure level of nuclei and electrons and the atomistic/molecular level. It presents

**Computational Materials Science**

Emphasising essential methods and universal principles, this textbook provides everything students need to understand the basics of simulating materials behaviour. All the key topics are covered from electronic structure methods to microstructural evolution, appendices provide crucial background material, and a wealth of practical resources are available online to complete the teaching package. Modelling is examined at a broad range of scales, from the atomic to the mesoscale, providing students with a solid foundation for future study and research. Detailed, accessible explanations of the fundamental equations underpinning materials modelling are presented, including a full chapter summarising essential mathematical background. Extensive appendices, including essential background on classical and quantum mechanics, electrostatics, statistical thermodynamics and linear elasticity, provide the background necessary to fully engage with the fundamentals of computational modelling. Exercises, worked examples, computer codes and discussions of practical implementations methods are all provided online giving students the hands-on experience they need.

**Beyond the Molecular Frontier**

The development of materials for clean and efficient energy generation and storage is one of the most rapidly developing, multi-disciplinary areas of contemporary science, driven primarily by concerns over global warming, diminishing fossil-fuel reserves, the need for energy security, and increasing consumer demand for portable electronics. Computational methods are now an integral and indispensable part of the materials characterisation and development process. Computational Approaches to Energy Materials presents a detailed survey of current computational techniques for the development and optimization of energy materials, outlining their strengths, limitations, and future applications. The review of techniques includes current methodologies based on electronic structure, interatomic potential and hybrid
methodological components are integrated into a comprehensive survey of applications, addressing the major themes in energy research. Topics covered include: • Introduction to computational methods and approaches • Modelling materials for energy generation applications: solar energy and nuclear energy • Modelling materials for storage applications: batteries and hydrogen • Modelling materials for energy conversion applications: fuel cells, heterogeneous catalysis and solid-state lighting • Nanostructures for energy applications. This full colour text is an accessible introduction for newcomers to the field, and a valuable reference source for experienced researchers working on computational techniques and their application to energy materials.

**Computational Nanomedicine and Nanotechnology**

The development of computational methods that support human health and environmental risk assessment of engineered nanomaterials has attracted great interest because the application of these methods enables us to fill existing experimental data gaps. However, considering the high degree of complexity and multifunctionality of engineered nanoparticles, computational methods originally developed for regular (i.e., classic) chemicals cannot always be applied explicitly in nanotoxicology. Thus, the main idea of this book is to discuss the current state of the art and future needs in the development of computational modeling techniques for nanotoxicology. The book focuses on methodology. Among various in silico techniques, special attention is given to (i) computational chemistry (quantum mechanics, semi-empirical methods, density functional theory, molecular mechanics, molecular dynamics); (ii) nanochemoinformatic methods (quantitative structure-activity relationship modeling, grouping, read-across); and (iii) nanobioinformatic methods (genomics, transcriptomics, proteomics, metabolomics).

**Nanoscale Flow**

The Finite Difference Time Domain (FDTD) method is an essential tool in modeling inhomogeneous, anisotropic, and dispersive media with random, multilayered, and periodic fundamental (or device) nanostructures due to its features of extreme flexibility and easy implementation. It has led to many new discoveries concerning guided modes in nanoplasmonic waveguides and continues to attract attention from researchers across the globe. Written in a manner that is easily digestible to beginners and useful to seasoned professionals, Computational Nanotechnology Using Finite Difference Time Domain describes the key concepts of the computational FDTD method used in nanotechnology. The book discusses the newest and most popular computational nanotechnologies using the FDTD method, considering their primary benefits. It also predicts future applications of nanotechnology in technical industry by examining the results of interdisciplinary research conducted by world-renowned experts. Complete with case studies, examples, supportive appendices, and FDTD codes accessible via a companion website, Computational Nanotechnology Using Finite Difference.
Time Domain not only delivers a practical introduction to the use of FDTD in nanotechnology but also serves as a valuable reference for academia and professionals working in the fields of physics, chemistry, biology, medicine, material science, quantum science, electrical and electronic engineering, electromagnetics, photonics, optical science, computer science, mechanical engineering, chemical engineering, and aerospace engineering.

**Computational Strategies for Spectroscopy**

This reference offers tools for engineers, scientists, biologists, and others working with the computational techniques of nanophotonics. It introduces the key concepts of computational methods in a manner that is easily digestible for newcomers to the field. The book also examines future applications of nanophotonics in the technical industry and covers new developments and interdisciplinary research in engineering, science, and medicine. It provides an overview of the key computational nanophotonics and describes the technologies with an emphasis on how they work and their key benefits.

**Multiscale Modeling in Solid Mechanics**

Computational Modelling of Nanoparticles highlights recent advances in the power and versatility of computational modelling, experimental techniques, and how new progress has opened the door to a more detailed and comprehensive understanding of the world of nanomaterials. Nanoparticles, having dimensions of 100 nanometers or less, are increasingly being used in applications in medicine, materials and manufacturing, and energy. Spanning the smallest sub-nanometer nanoclusters to nanocrystals with diameters of 10s of nanometers, this book provides a state-of-the-art overview on how computational modelling can provide, often otherwise unobtainable, insights into nanoparticulate structure and properties. This comprehensive, single resource is ideal for researchers who want to start/improve their nanoparticle modelling efforts, learn what can be (and what cannot) achieved with computational modelling, and understand more clearly the value and details of computational modelling efforts in their area of research. Explores how computational modelling can be successfully applied at the nanoscale level Includes techniques for the computation modelling of different types of nanoclusters, including nanoalloy clusters, fullerines and Ligated and/or solvated nanoclusters Offers complete coverage of the use of computational modelling at the nanoscale, from characterization and processing, to applications

**Computational Nanotechnology**

This reference offers tools for engineers, scientists, biologists, and others working with the computational techniques of nanophotonics. It introduces the key concepts of computational methods in a manner that is easily digestible for newcomers to the field. The book also examines future applications of nanophotonics in the technical industry and covers
new developments and interdisciplinary research in engineering, science, and medicine. It provides an overview of the key computational nanophotonics and describes the technologies with an emphasis on how they work and their key benefits.

**Computational Nanotechnology Using Finite Difference Time Domain**

Computational spectroscopy is a rapidly evolving field that is becoming a versatile and widespread tool for the assignment of experimental spectra and their interpretation as related to chemical physical effects. This book is devoted to the most significant methodological contributions in the field, and to the computation of IR, UV-VIS, NMR and EPR spectral parameters with reference to the underlying vibronic and environmental effects. Each section starts with a chapter written by an experimental spectroscopist dealing with present challenges in the different fields; comprehensive coverage of conventional and advanced spectroscopic techniques is provided by means of dedicated chapters written by experts. Computational chemists, analytical chemists and spectroscopists, physicists, materials scientists, and graduate students will benefit from this thorough resource.

**Computational Anatomical Animal Models**

This book focuses on computational intelligence techniques and their applications — fast-growing and promising research topics that have drawn a great deal of attention from researchers over the years. It brings together many different aspects of the current research on intelligence technologies such as neural networks, support vector machines, fuzzy logic and evolutionary computation, and covers a wide range of applications from pattern recognition and system modeling, to intelligent control problems and biomedical applications. Fundamental concepts and essential analysis of various computational techniques are presented to offer a systematic and effective tool for better treatment of different applications, and simulation and experimental results are included to illustrate the design procedure and the effectiveness of the approaches. Sample Chapter(s) Chapter 1: Maximal Margin Algorithms for Pose Estimation (658 KB)

Contents:
- Evolutionary Computation and Its Applications: Maximal Margin Algorithms for Pose Estimation (Ying Guo and Jiaming Li)
- Polynomial Modeling in a Dynamic Environment Based on a Particle Swarm Optimization (Kit Yan Chan and Tharam S Dillon)
- Restoration of Half-toned Color-quantized Images Using Particle Swarm Optimization with Multi-wavelet Mutation (Frank H F Leung, Benny C W Yeung and Y H Chan)
- Fuzzy Logics and Their Applications: Hypoglycemia Detection for Insulin-dependent Diabetes Mellitus: Evolved Fuzzy Inference System Approach (S H Ling, P P San and H T Nguyen)
- Neural Networks and Their Applications: Study of Limit Cycle Behavior of Weights of Perceptron (C Y F Ho and B W K Ling)
- Artificial Neural Network Modeling with Application to Nonlinear Dynamics (Yi Zhao)
- Solving Eigen-problems of Matrices by Neural Networks (Yiguang Liu, Zhisheng You, Bingbing Liu and Jiliu Zhou)
- Automated Screw Insertion Monitoring Using Neural Networks: A Computational Intelligence Approach to Assembly in Manufacturing (Bruno Lara, Lakmal D Seneviratne and
Kaspar Althoefer)Support Vector Machines and Their Applications: On the Applications of Heart Disease Risk Classification and Hand-written Character Recognition Using Support Vector Machines (S R Alty, H K Lam and J Prada) Nonlinear Modeling Using Support Vector Machine for Heart Rate Response to Exercise (Weidong Chen, Steven W Su, Yi Zhang, Ying Guo, Nghir Nguyen, Branko G Celler and Hung T Nguyen) Machine Learning-based Nonlinear Model Predictive Control for Heart Rate Response to Exercise (Yi Zhang, Steven W Su, Branko G Celler and Hung T Nguyen) Intelligent Fault Detection and Isolation of HVAC System Based on Online Support Vector Machine (Davood Dehestani, Ying Guo, Sai Ho Ling, Steven W Su and Hung T Nguyen) Readership: Graduates and researchers in computer science, especially those specialising in artificial intelligence, neural networks, fuzzy logic and pattern recognition. Keywords: Evolutionary Computation; Fuzzy Logic; Neural Networks; Support Vector Machine Key Features: Covers wide-ranging applications from pattern recognition, control systems to biomedical applications. Various computational techniques are proposed and presented in detail for the treatment of various problems Most of the applications in this book are real and high impact, such as hypoglycaemia, detection for diabetes patients, cardio respiratory response estimation, pattern recognition and pose estimation Addresses important related problems and difficulties using the collective experiences and knowledge from the contributors, who are each prominent in their own area of research

**Computational Physics of Carbon Nanotubes**

Molecular modeling techniques have been widely used in drug discovery fields for rational drug design and compound screening. Now these techniques are used to model or mimic the behavior of molecules, and help us study formulation at the molecular level. Computational pharmaceutics enables us to understand the mechanism of drug delivery, and to develop new drug delivery systems. The book discusses the modeling of different drug delivery systems, including cyclodextrins, solid dispersions, polymorphism prediction, dendrimer-based delivery systems, surfactant-based micelle, polymeric drug delivery systems, liposome, protein/peptide formulations, non-viral gene delivery systems, drug-protein binding, silica nanoparticles, carbon nanotube-based drug delivery systems, diamond nanoparticles and layered double hydroxides (LDHs) drug delivery systems. Although there are a number of existing books about rational drug design with molecular modeling techniques, these techniques still look mysterious and daunting for pharmaceutical scientists. This book fills the gap between pharmaceutics and molecular modeling, and presents a systematic and overall introduction to computational pharmaceutics. It covers all introductory, advanced and specialist levels. It provides a totally different perspective to pharmaceutical scientists, and will greatly facilitate the development of pharmaceutics. It also helps computational chemists to look for the important questions in the drug delivery field. This book is included in the Advances in Pharmaceutical Technology book series.

**Computational Fluid Dynamics**
This book presents the key theories, computational modelling and numerical simulation tools required to understand carbon nanotube physics. Specifically, methods applied to geometry and bonding, mechanical, thermal, transport and storage properties are addressed. This self-contained book will interest researchers across a broad range of disciplines.

**Computational Nanophotonics**

Computational Physics is now a discipline in its own right, comparable with theoretical and experimental physics. Computational Materials Science concentrates on the calculation of materials properties starting from microscopic theories. It has become a powerful tool in industrial research for designing new materials, modifying materials properties and optimizing chemical processes. This book focusses on the application of computational methods in new fields of research, such as nanotechnology, spintronics and photonics, which will provide the foundation for important technological advances in the future. Methods such as electronic structure calculations, molecular dynamics simulations and beyond are presented, the discussion extending from the basics to the latest applications.

**Computational Modelling of Nanoparticles**

Positioning itself at the common boundaries of several disciplines, this work provides new perspectives on modern nanoscale problems where fundamental science meets technology and computer modeling. In addition to well-known computational techniques such as finite-difference schemes and Ewald summation, the book presents a new finite-difference calculus of Flexible Local Approximation Methods (FLAME) that qualitatively improves the numerical accuracy in a variety of problems.

**Computational Multiscale Modeling of Multiphase Nanosystems**

Simulating blood cells for biomedical applications is a challenging goal. Whether you want to investigate blood flow behavior on the cell scale, or use a blood cell model for fast computational prototyping in microfluidics, Computational Blood Cell Mechanics will help you get started, and show you the path forward. The text presents a step-by-step approach to cell model building that can be adopted when developing and validating models for biomedical applications, such as filtering and sorting cells, or examining flow and deformations of individual cells under various conditions. It starts with basic building-blocks that, together, model the red blood cell membrane according to its physical properties, before moving on to discuss several issues that may pose problems along the way, and finally leads to suggestions on how to set up computational experiments. More details available at www.compbloodcell.eu
Hybrid Computational Intelligence

Illustrates the application of mathematical and computational modeling in a variety of disciplines With an emphasis on the interdisciplinary nature of mathematical and computational modeling, Mathematical and Computational Modeling: With Applications in the Natural and Social Sciences, Engineering, and the Arts features chapters written by well-known, international experts in these fields and presents readers with a host of state-of-the-art achievements in the development of mathematical modeling and computational experiment methodology. The book is a valuable guide to the methods, ideas, and tools of applied and computational mathematics as they apply to other disciplines such as the natural and social sciences, engineering, and technology. Mathematical and Computational Modeling: With Applications in the Natural and Social Sciences, Engineering, and the Arts also features: Rigorous mathematical procedures and applications as the driving force behind mathematical innovation and discovery Numerous examples from a wide range of disciplines to emphasize the multidisciplinary application and universality of applied mathematics and mathematical modeling Original results on both fundamental theoretical and applied developments in diverse areas of human knowledge Discussions that promote interdisciplinary interactions between mathematicians, scientists, and engineers Mathematical and Computational Modeling: With Applications in the Natural and Social Sciences, Engineering, and the Arts is an ideal resource for professionals in various areas of mathematical and statistical sciences, modeling and simulation, physics, computer science, engineering, biology and chemistry, industrial, and computational engineering. The book also serves as an excellent textbook for graduate courses in mathematical modeling, applied mathematics, numerical methods, operations research, and optimization.

Introduction to Computational Materials Science

Understanding the physical properties and dynamical behavior of nanochannel flows has been of great interest in recent years and is important for the theoretical study of fluid dynamics and engineering applications in physics, chemistry, medicine, and electronics. The flows inside nanoscale pores are also important due to their highly beneficial drag and heat transfer properties. Nanoscale Flow: Advances, Modeling, and Applications presents the latest research in the multidisciplinary area of nanoscale flow. Featuring contributions from top inventors in industry, academia, and government, this comprehensive book: Highlights the current status of research on nucleate pool boiling heat transfer, flow boiling heat transfer, and critical heat flux (CHF) phenomena of nanofluids Describes two novel fractal models for pool boiling heat transfer of nanofluids, including subcooled pool boiling and nucleate pool boiling Explores thermal conductivity enhancement in nanofluids measured with a hot-wire calorimeter Discusses two-phase laminar mixed convection AL2O3-water nanofluid in an elliptic duct Explains the principles of molecular and omics imaging and spectroscopy techniques for cancer detection Analyzes fluid dynamics modeling of the tumor vasculature and drug transport Studies the
properties of nanoscale particles and their impact on diagnosis, therapeutics, and theranostics Provides a brief background and review of medical nanoscale flow applications Contains useful appendices of physical constants, equations, common symbols, mathematical formulas, the periodic table, and more A valuable reference for engineers, scientists, and biologists, Nanoscale Flow: Advances, Modeling, and Applications is also designed for researchers, universities, industrial institutions, and government, giving it broad appeal.

**Computational Nanotoxicology**

This volume describes different computational methods encompassing ligand-based approaches (QSAR, pharmcophore), structure-based approaches (homology modeling, docking, molecular dynamics simulation), and combined approaches (virtual screening) with applications in anti-Alzheimer drug design. Different background topics like molecular etiologies of Alzheimer’s disease, targets for new drug development, and different cheminformatic modeling strategies are covered for completeness. Special topics like multi-target drug development, natural products, protein misfolding, and nanomaterials are also included in connection with computational modeling of anti-Alzheimer drug development. In Neuromethods series style, chapters include the kind of detail and key advice from the specialists needed to get successful results in your laboratory. Cutting-edge and authoritative, Computational Modeling of Drugs Against Alzheimer’s Disease is a valuable resource for learning about the latest computational techniques used to study this disease.

**Computational Methods for Nanoscale Applications**

Computational Multiscale Modeling of Multiphase Nanosystems: Theory and Applications presents a systematic description of the theory of multiscale modeling of nanotechnology applications in various fields of science and technology. The problems of computing nanoscale systems at different structural scales are defined, and algorithms are given for their numerical solutions by the quantum/continuum mechanics, molecular dynamics, and mesodynamics methods. Emphasis is given to the processes of the formation, movement, and interaction of nanoparticles; the formation of nanocomposites; and the processes accompanying the application of nanocomposites. The book concentrates on different types of nanosystems: solid, liquid, gaseous, and multi-phase, consisting of various elements interacting with each other, and with other elements of the nanosystem and with the environment. The book includes a large number of examples of numerical modeling of nanosystems. The valuable information presented here will be useful to engineers, researchers, and postgraduate students engaged in the design and research in the field of nanotechnology.

**Computational Pharmaceutics**
The Finite Difference Time Domain (FDTD) method is an essential tool in modeling inhomogeneous, anisotropic, and dispersive media with random, multilayered, and periodic fundamental (or device) nanostructures due to its features of extreme flexibility and easy implementation. It has led to many new discoveries concerning guided modes in nanoplasmic waveguides and continues to attract attention from researchers across the globe. Written in a manner that is easily digestible to beginners and useful to seasoned professionals, Computational Nanotechnology Using Finite Difference Time Domain describes the key concepts of the computational FDTD method used in nanotechnology. The book discusses the newest and most popular computational nanotechnologies using the FDTD method, considering their primary benefits. It also predicts future applications of nanotechnology in technical industry by examining the results of interdisciplinary research conducted by world-renowned experts. Complete with case studies, examples, supportive appendices, and FDTD codes accessible via a companion website, Computational Nanotechnology Using Finite Difference Time Domain not only delivers a practical introduction to the use of FDTD in nanotechnology but also serves as a valuable reference for academia and professionals working in the fields of physics, chemistry, biology, medicine, material science, quantum science, electrical and electronic engineering, electromagnetics, photonics, optical science, computer science, mechanical engineering, chemical engineering, and aerospace engineering.

Cognitive and Computational Neuroscience

This book explores the latest and most relevant topics in the field of computational bioengineering and bioinformatics, with a particular focus on patient-specific, disease-progression modeling. It covers computational methods for cardiovascular disease prediction, with an emphasis on biomechanics, biomedical decision support systems, data mining, personalized diagnostics, bio-signal processing, protein structure prediction, biomedical image processing, analysis and visualization, and high-performance computing. It also discusses state-of-the-art tools for disease characterization, and recent advances in areas such as biomechanics, cardiovascular engineering, patient-specific modeling, population-based modeling, multiscale modeling, image processing, data mining, biomedical decision-support systems, signal processing, biomaterials and dental biomechanics, tissue and cell engineering, computational chemistry and high-performance computing. As such, it is a valuable resource for researchers, medical and bioengineering students, and medical device and software experts.

Computational Finite Element Methods in Nanotechnology

Computational Finite Element Methods in Nanotechnology demonstrates the capabilities of finite element methods in nanotechnology for a range of fields. Bringing together contributions from researchers around the world, it covers key concepts as well as cutting-edge research and applications to inspire new developments and future interdisciplinary research. In particular, it emphasizes the importance of finite element methods (FEMs) for computational tools in the...
development of efficient nanoscale systems. The book explores a variety of topics, including: A novel FE-based thermo-
electrical-mechanical-coupled model to study mechanical stress, temperature, and electric fields in nano- and
microelectronics The integration of distributed element, lumped element, and system-level methods for the design,
modeling, and simulation of nano- and micro-electromechanical systems (N/MEMS) Challenges in the simulation of
nanorobotic systems and macro-dimensions The simulation of structures and processes such as dislocations, growth of
epitaxial films, and precipitation Modeling of self-positioning nanostructures, nanocomposites, and carbon nanotubes and
their composites Progress in using FEM to analyze the electric field formed in needleless electrospinning How molecular
dynamic (MD) simulations can be integrated into the FEM Applications of finite element analysis in nanomaterials and
systems used in medicine, dentistry, biotechnology, and other areas The book includes numerous examples and case
studies, as well as recent applications of microscale and nanoscale modeling systems with FEMs using COMSOL
Multiphysics® and MATLAB®. A one-stop reference for professionals, researchers, and students, this is also an accessible
introduction to computational FEMs in nanotechnology for those new to the field.