

Iso2mesh An Image Based Mesh Generation Toolbox

Provides a detailed and systematic description of the Method of Moments (Boundary Element Method) for electromagnetic modeling at low frequencies and includes hands-on, application-based MATLAB® modules with user-friendly and intuitive GUI and a highly visualized interactive output. Includes a full-body computational human phantom with over 120 triangular surface meshes extracted from the Visible Human Project® Female dataset of the National Library of Medicine and fully compatible with MATLAB® and major commercial FEM/BEM electromagnetic software simulators. This book covers the basic concepts of computational low-frequency electromagnetics in an application-based format and hones the knowledge of these concepts with hands-on MATLAB® modules. The book is divided into five parts. Part 1 discusses low-frequency electromagnetics, basic theory of triangular surface mesh generation, and computational human phantoms. Part 2 covers electrostatics of conductors and dielectrics, and direct current flow. Linear magnetostatics is analyzed in Part 3. Part 4 examines theory and applications of eddy currents. Finally, Part 5 evaluates nonlinear electrostatics. Application examples included in this book cover all major subjects of low-frequency electromagnetic theory. In addition, this book includes complete or summarized analytical solutions to a large number of quasi-static electromagnetic problems. Each Chapter concludes with a summary of the corresponding MATLAB® modules. Combines fundamental electromagnetic theory and application-oriented computation algorithms in the form of stand alone MATLAB® modules. Makes use of the three-dimensional Method of Moments (MoM) for static and quasistatic electromagnetic problems. Contains a detailed full-body computational human phantom from the Visible Human Project® Female, embedded implant models, and a collection of homogeneous human shells. Low-Frequency Electromagnetic Modeling for Electrical and Biological Systems Using MATLAB® is a resource for electrical and biomedical engineering students and practicing researchers, engineers, and medical doctors working on low-frequency modeling and bioelectromagnetic applications.

This volume contains the articles presented at the 16th International Meshing Roundtable (IMR) organized, in part, by Sandia National Laboratories and held in Seattle, Washington, U.S.A. in October, 2007. The volume presents recent results of mesh generation and adaptation which has applications to finite element simulation. It introduces theoretical and novel ideas with practical potential.

This book provides a comprehensive overview on Transcranial Direct Current Stimulation (tDCS) and the clinical applications of this promising technique. Separated into three parts, the book begins with basic principles, mechanisms and approaches of tDCS. This is followed by a step-by-step practicum, methodological considerations and ethics and professional conduct pertaining to this novel technique. Chapters are authored by renowned experts who also direct and plan tDCS educational events worldwide. Bridging the existing gap in instructional materials for tDCS while addressing growing interest in education in this field, professionals within a broad range of medical disciplines will find this text to be an invaluable guide.

With a lot of recent developments in the field, this much-needed book has come at just the right time. It covers a variety of topics related to preserving and enhancing shape information at a geometric level. The contributors also cover subjects that are relevant to effectively capturing the structure of a shape by identifying relevant shape components and their mutual relationships.

The four-volume set LNCS 11070, 11071, 11072, and 11073 constitutes the refereed proceedings of the 21st International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2018, held in Granada, Spain, in September 2018. The 373 revised full papers presented were carefully reviewed and selected from 1068 submissions in a double-blind review process. The papers have been organized in the following topical sections: Part I: Image Quality and Artefacts; Image Reconstruction Methods; Machine Learning in Medical Imaging; Statistical Analysis for Medical Imaging; Image Registration Methods. Part II: Optical and Histology Applications: Optical Imaging Applications; Histology Applications; Microscopy Applications; Optical Coherence Tomography and Other Optical Imaging Applications. Cardiac, Chest and Abdominal Applications: Cardiac Imaging Applications: Colorectal, Kidney and Liver Imaging Applications; Lung Imaging Applications; Breast Imaging Applications; Other Abdominal Applications. Part III: Diffusion Tensor Imaging and Functional MRI: Diffusion Tensor Imaging; Diffusion Weighted Imaging; Functional MRI; Human Connectome. Neuroimaging and Brain Segmentation Methods: Neuroimaging; Brain Segmentation Methods. Part IV: Computer Assisted Intervention: Image Guided Interventions and Surgery; Surgical Planning, Simulation and Work Flow Analysis; Visualization and Augmented Reality. Image Segmentation Methods: General Image Segmentation Methods, Measures and Applications; Multi-Organ Segmentation; Abdominal Segmentation Methods; Cardiac Segmentation Methods; Chest, Lung and Spine Segmentation; Other Segmentation Applications.

Because of the uneven distribution of fresh water in time and space and the increasing human population, a large number of regions are experiencing water scarcity and stress. Membrane-based desalination technologies like reverse osmosis have the potential to solve the fresh water crisis in coastal areas. However, in many cases membrane performance is restricted by biofouling. Biofouling of Membrane Systems gives a comprehensive overview on the state of the art strategies to control biofouling in spiral wound reverse osmosis membrane systems and point to possible future research directions. Despite the fact that much research and development has been done to overcome biofouling in spiral wound membrane systems used for water treatment, biofouling is still a major practical problem causing performance decline and increased energy demand. Biofouling of Membrane Systems is divided into three sections including modelling and numerical analysis, non-destructive characterization and feed spacer geometry optimization. It focuses on the development of biomass in the feed channel of the membrane module and its effect on pressure drop and hydrodynamics. This book can be used to develop an integral strategy to control biofouling in spiral wound membrane

systems. An overview of several potential complementary approaches to solve biofouling is given and an integrated approach for biofouling control and feed spacer design is proposed.

The six-volume set LNCS 11764, 11765, 11766, 11767, 11768, and 11769 constitutes the refereed proceedings of the 22nd International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2019, held in Shenzhen, China, in October 2019. The 539 revised full papers presented were carefully reviewed and selected from 1730 submissions in a double-blind review process. The papers are organized in the following topical sections: Part I: optical imaging; endoscopy; microscopy. Part II: image segmentation; image registration; cardiovascular imaging; growth, development, atrophy and progression. Part III: neuroimage reconstruction and synthesis; neuroimage segmentation; diffusion weighted magnetic resonance imaging; functional neuroimaging (fMRI); miscellaneous neuroimaging. Part IV: shape; prediction; detection and localization; machine learning; computer-aided diagnosis; image reconstruction and synthesis. Part V: computer assisted interventions; MIC meets CAI. Part VI: computed tomography; X-ray imaging.

As a new interdisciplinary research area, "image-based geometric modeling and mesh generation" integrates image processing, geometric modeling and mesh generation with finite element method (FEM) to solve problems in computational biomedicine, materials sciences and engineering. It is well known that FEM is currently well-developed and efficient, but mesh generation for complex geometries (e.g., the human body) still takes about 80% of the total analysis time and is the major obstacle to reduce the total computation time. It is mainly because none of the traditional approaches is sufficient to effectively construct finite element meshes for arbitrarily complicated domains, and generally a great deal of manual interaction is involved in mesh generation. This contributed volume, the first for such an interdisciplinary topic, collects the latest research by experts in this area. These papers cover a broad range of topics, including medical imaging, image alignment and segmentation, image-to-mesh conversion, quality improvement, mesh warping, heterogeneous materials, biomodelcular modeling and simulation, as well as medical and engineering applications. This contributed volume, the first for such an interdisciplinary topic, collects the latest research by experts in this area. These papers cover a broad range of topics, including medical imaging, image alignment and segmentation, image-to-mesh conversion, quality improvement, mesh warping, heterogeneous materials, biomodelcular modeling and simulation, as well as medical and engineering applications. This contributed volume, the first for such an interdisciplinary topic, collects the latest research by experts in this area. These papers cover a broad range of topics, including medical imaging, image alignment and segmentation, image-to-mesh conversion, quality improvement, mesh warping, heterogeneous materials, biomodelcular modeling and simulation, as well as medical and engineering applications. This contributed volume, the first for such an interdisciplinary topic, collects the latest research by experts in this area. These papers cover a broad range of topics, including medical imaging, image alignment and segmentation, image-to-mesh conversion, quality improvement, mesh warping, heterogeneous materials, biomodelcular modeling and simulation, as well as medical and engineering applications.

The 5th International Workshop on Medical Imaging and Augmented Reality, MIAR 2010, was held at the China National Convention Center (CNCC), B-jing, China on September 19–20, 2010. MIAR has remained a truly international meeting, bringing together - searchers from all ?elds related to medical image analysis, visualization and targeted intervention. In recent years, technical advances in therapeutic delivery and growing demand for patient-specific treatment have accelerated the clinical applications of MIAR-related techniques. Imaging plays an increasingly important role in targeted therapy, with interventions such as drug or gene therapy relying on more accurate delivery tailored to individual patients. Rapid progress in surgical methodologies, such as those with robot assistance, demands precise guidance from both preoperative and intraoperative imaging. The volume of data available from existing and emerging imaging modalities leads to a - sire for more automated analysis for diagnosis, segmentation and registration. Research in this rapidly developing area is highly multi-disciplinary, integrating research in life sciences, physical sciences, engineering, and medicine.

This work collects the most important results presented at the Congress on Differential Equations and Applications/Congress on Applied Mathematics (CEDYA/CMA) in Cádiz (Spain) in 2015. It supports further research in differential equations, numerical analysis, mechanics, control and optimization. In particular, it helps readers gain an overview of specific problems of interest in the current mathematical research related to different branches of applied mathematics. This includes the analysis of nonlinear partial differential equations, exact solutions techniques for ordinary differential equations, numerical analysis and numerical simulation of some models arising in experimental sciences and engineering, control and optimization, and also trending topics on numerical linear Algebra, dynamical systems, and applied mathematics for Industry. This volume is mainly addressed to any researcher interested in the applications of mathematics, especially in any subject mentioned above. It may be also useful to PhD students in applied mathematics, engineering or experimental sciences.

The eight-volume set LNCS 12901, 12902, 12903, 12904, 12905, 12906, 12907, and 12908 constitutes the refereed proceedings of the 24th International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2021, held in Strasbourg, France, in September/October 2021.* The 531 revised full papers presented were carefully reviewed and selected from 1630 submissions in a double-blind review process. The papers are organized in the following topical sections: Part I: image segmentation Part II: machine learning - self-supervised learning; machine learning - semi-supervised learning; and machine learning - weakly supervised learning Part III: machine learning - advances in machine learning theory; machine learning - attention models; machine learning - domain adaptation; machine learning - federated learning; machine learning - interpretability / explainability; and machine learning - uncertainty Part IV: image registration; image-guided interventions and surgery; surgical data science; surgical planning and simulation; surgical skill and work flow analysis; and surgical visualization and mixed, augmented and virtual reality Part V: computer aided diagnosis; integration of imaging with non-imaging biomarkers; and outcome/disease prediction Part VI: image reconstruction; clinical applications - cardiac; and clinical applications - vascular Part VII: clinical applications - abdomen; clinical applications - breast; clinical applications - dermatology; clinical applications - fetal imaging; clinical applications - lung; clinical applications - neuroimaging - brain development; clinical applications - neuroimaging - DWI and tractography; clinical applications - neuroimaging - functional brain networks; clinical applications - neuroimaging -

others; and clinical applications - oncology Part VIII: clinical applications - ophthalmology; computational (integrative) pathology; modalities - microscopy; modalities - histopathology; and modalities - ultrasound *The conference was held virtually.

This book constitutes the thoroughly refereed post-workshop proceedings of the 7th International Workshop on Statistical Atlases and Computational Models of the Heart: Imaging and Modelling Challenges. 7th International Workshop, STACOM 2016, Held in conjunction with MICCAI 2016, Athens, Greece, October 17, 2016, Revised Selected papers The 24 revised full workshop papers were carefully reviewed and selected from 32 submissions. The papers cover a wide range of topics such as cardiac image processing; atlas construction, statistical modelling of cardiac function across different patient populations; cardiac mapping, cardiac computational physiology; model customization; image-based modelling and image-guided interventional procedures; atlas based functional analysis, ontological schemata for data and results; integrated functional and structural analyses; pre-clinical and clinical applicability of the methods described.

With the advances in image guided surgery for cancer treatment, the role of image segmentation and registration has become very critical. The central engine of any image guided surgery product is its ability to quantify the organ or segment the organ whether it is a magnetic resonance imaging (MRI) and computed tomography (CT), X-ray, PET, SPECT, Ultrasound, and Molecular imaging modality. Sophisticated segmentation algorithms can help the physicians delineate better the anatomical structures present in the input images, enhance the accuracy of medical diagnosis and facilitate the best treatment planning system designs. The focus of this book is towards the state of the art techniques in the area of image segmentation and registration.

This book presents cutting-edge papers and perspectives on the transport of oxygen to tissues by scientists in a multitude of disciplines such as biochemistry, engineering, mathematics, medicine, physics, physiology, veterinary and complementary medicine. The book is composed of the following 6 parts: Brain Oxygenation and Function, Tumor Oxygenation and Metabolism, Muscle Oxygenation and Sports Medicine, Cell Metabolism and Tissue Oxygenation, Methodology of O₂ Measurements, and Special Topics. The articles in this book have been presented at the 46th annual meeting of the International Society on Oxygen Transport to Tissue (ISOTT 2018) held in Seoul, Republic of Korea, from July 1 to July 5, 2018. Academics, clinical and industry researchers, engineers, as well as graduate students who are interested in oxygen transport to tissue will find this book a great reference and a useful learning resource.

This book contains the Proceedings of EUROCK 2013 - The 2013 ISRM International Symposium, which was held on 23-26 September 2013 in Wroclaw, Poland. The Symposium was organized by the ISRM National Group POLAND and the Institute of Geotechnics and Hydrotechnics of the Wroclaw Institute of Technology. The focus of the Symposium was on recent developments. In den letzten Jahren hat sich der Workshop "Bildverarbeitung für die Medizin" durch erfolgreiche Veranstaltungen etabliert. Ziel ist auch 2015 wieder die Darstellung aktueller Forschungsergebnisse und die Vertiefung der Gespräche zwischen Wissenschaftlern, Industrie und Anwendern. Die Beiträge dieses Bandes - einige davon in englischer Sprache - umfassen alle Bereiche der medizinischen Bildverarbeitung, insbesondere Bildgebung und -akquisition, Molekulare Bildgebung, Visualisierung und Animation, Bildsegmentierung und -fusion, Sichtbares Licht, Endoskopie, Mikroskopie, Zeitreihenanalysen, Biomechanische Modellierung, Klinische Anwendung computerunterstützter Systeme, Validierung und Qualitätssicherung, Virtual / Augmented Reality, Bildgestützte Roboter, Chirurgische Simulatoren u.v.m.

Written by authors at the forefront of modern algorithms research, Delaunay Mesh Generation demonstrates the power and versatility of Delaunay meshers in tackling complex geometric domains ranging from polyhedra with internal boundaries to piecewise smooth surfaces. Covering both volume and surface meshes, the authors fully explain how and why these meshing algorithms work. The book is one of the first to integrate a vast amount of cutting-edge material on Delaunay triangulations. It begins with introducing the problem of mesh generation and describing algorithms for constructing Delaunay triangulations. The authors then present algorithms for generating high-quality meshes in polygonal and polyhedral domains. They also illustrate how to use restricted Delaunay triangulations to extend the algorithms to surfaces with ridges and patches and volumes with smooth surfaces. For researchers and graduate students, the book offers a rigorous theoretical analysis of mesh generation methods. It provides the necessary mathematical foundations and core theoretical results upon which researchers can build even better algorithms in the future. For engineers, the book shows how the algorithms work well in practice. It explains how to effectively implement them in the design and programming of mesh generation software.

Statistical Shape and Deformation Analysis: Methods, Implementation and Applications contributes enormously to solving different problems in patient care and physical anthropology, ranging from improved automatic registration and segmentation in medical image computing to the study of genetics, evolution and comparative form in physical anthropology and biology. This book gives a clear description of the concepts, methods, algorithms and techniques developed over the last three decades that is followed by examples of their implementation using open source software. Applications of statistical shape and deformation analysis are given for a wide variety of fields, including biometry, anthropology, medical image analysis and clinical practice. Presents an accessible introduction to the basic concepts, methods, algorithms and techniques in statistical shape and deformation analysis Includes implementation examples using open source software Covers real-life applications of statistical shape and deformation analysis methods

This book constitutes the refereed joint proceedings of the International Workshop on Fetal and Infant Image Analysis, FIFI 2017, and the 6th International Workshop on Ophthalmic Medical Image Analysis, OMIA 2017, held in conjunction with the 20th International Conference on Medical Imaging and Computer-Assisted Intervention, MICCAI 2017, in Québec City, QC, Canada, in September 2017. The 8 full papers presented at FIFI 2017 and the 20 full papers presented at OMIA 2017 were carefully reviewed and selected. The FIFI papers feature research on advanced image analysis approaches focused on the analysis of growth and development in the fetal, infant and paediatric period. The OMIA papers cover various topics in the field of ophthalmic image analysis.

This book explores numerical implementation of Finite Element Analysis using MATLAB. Stressing interactive use of MATLAB, it provides examples and exercises from mechanical, civil and aerospace engineering as well as materials science. The text includes a short MATLAB tutorial. An extensive solutions manual offers detailed solutions to all problems in the book for classroom use. The second edition includes a new brick (solid) element with eight nodes and a one-dimensional fluid flow element. Also added is a review of applications of finite elements in fluid flow, heat transfer, structural dynamics and electro-magnetics. The accompanying CD-ROM presents more than fifty MATLAB functions.

This book constitutes the refereed proceedings of the 6th International Workshop on Simulation and Synthesis in Medical Imaging, SASHIMI 2021, held in conjunction with MICCAI 2021, in Strasbourg, France, in September 2021.* The 14 full papers presented were carefully reviewed and selected from 18 submissions. The contributions span the following broad categories in alignment with the initial call-for-papers: methods based on generative models or adversarial learning for MRI/CT/ microscopy image synthesis, and several applications of image synthesis and simulation for data augmentation, image enhancement, or segmentation. *The workshop was held virtually.

Few fields have witnessed such impressive advances as the application of computer technology to radiology. The progress achieved has

revolutionized diagnosis and greatly facilitated treatment selection and accurate planning of procedures. This book, written by leading experts from many different countries, provides a comprehensive and up-to-date overview of the role of 3D image processing. The first section covers a wide range of technical aspects in an informative way. This is followed by the main section, in which the principal clinical applications are described and discussed in depth. To complete the picture, the final section focuses on recent developments in functional imaging and computer-aided surgery. This book will prove invaluable to all who have an interest in this complex but vitally important field.

Damage to the central nervous system resulting from pathological mechanical loading can occur as a result of trauma or disease. Such injuries lead to significant disability and mortality. The peripheral nervous system, while also subject to injury from trauma and disease, also transduces physiological loading to give rise to sensation, and mechanotransduction is also thought to play a role in neural development and growth. This book gives a complete and quantitative description of the fundamental mechanical properties of neural tissues, and their responses to both physiological and pathological loading. This book reviews the methods used to characterize the nonlinear viscoelastic properties of central and peripheral neural tissues, and the mathematical and sophisticated computational models used to describe this behaviour. Mechanisms and models of neural injury from both trauma and disease are reviewed from the molecular to macroscopic scale. The book provides a comprehensive picture of the mechanical and biological response of neural tissues to the full spectrum of mechanical loading to which they are exposed. This book provides a comprehensive reference for professionals involved in pre prevention of injury to the nervous system, whether this arises from trauma or disease.

This volume contains the articles presented at the 21st International Meshing Roundtable (IMR) organized, in part, by Sandia National Laboratories and was held on October 7–10, 2012 in San Jose, CA, USA. The first IMR was held in 1992, and the conference series has been held annually since. Each year the IMR brings together researchers, developers, and application experts in a variety of disciplines, from all over the world, to present and discuss ideas on mesh generation and related topics. The technical papers in this volume present theoretical and novel ideas and algorithms with practical potential, as well as technical applications in science and engineering, geometric modeling, computer graphics, and visualization.

This is the revised and expanded 1998 edition of a popular introduction to the design and implementation of geometry algorithms arising in areas such as computer graphics, robotics, and engineering design. The basic techniques used in computational geometry are all covered: polygon triangulations, convex hulls, Voronoi diagrams, arrangements, geometric searching, and motion planning. The self-contained treatment presumes only an elementary knowledge of mathematics, but reaches topics on the frontier of current research, making it a useful reference for practitioners at all levels. The second edition contains material on several new topics, such as randomized algorithms for polygon triangulation, planar point location, 3D convex hull construction, intersection algorithms for ray-segment and ray-triangle, and point-in-polyhedron. The code in this edition is significantly improved from the first edition (more efficient and more robust), and four new routines are included. Java versions for this new edition are also available. All code is accessible from the book's Web site (<http://cs.smith.edu/~orourke/>) or by anonymous ftp.

As one of the results of an ambitious project, this handbook provides a well-structured directory of globally available software tools in the area of Integrated Computational Materials Engineering (ICME). The compilation covers models, software tools, and numerical methods allowing describing electronic, atomistic, and mesoscopic phenomena, which in their combination determine the microstructure and the properties of materials. It reaches out to simulations of component manufacture comprising primary shaping, forming, joining, coating, heat treatment, and machining processes. Models and tools addressing the in-service behavior like fatigue, corrosion, and eventually recycling complete the compilation. An introductory overview is provided for each of these different modelling areas highlighting the relevant phenomena and also discussing the current state for the different simulation approaches. A must-have for researchers, application engineers, and simulation software providers seeking a holistic overview about the current state of the art in a huge variety of modelling topics. This handbook equally serves as a reference manual for academic and commercial software developers and providers, for industrial users of simulation software, and for decision makers seeking to optimize their production by simulations. In view of its sound introductions into the different fields of materials physics, materials chemistry, materials engineering and materials processing it also serves as a tutorial for students in the emerging discipline of ICME, which requires a broad view on things and at least a basic education in adjacent fields. Computational Modelling of Objects Represented in Images: Fundamentals, Methods and Applications III contains all contributions presented at the International Symposium CompIMAGE 2012 - Computational Modelling of Object Presented in Images: Fundamentals, Methods and Applications (Rome, Italy, 5-7 September 2012). The contributions cover the state-o

The aim of the second edition of this book is to provide a comprehensive survey of the different algorithms and data structures useful for triangulation and meshing construction. In addition, several aspects are given full coverage, such as mesh modification tools, mesh evaluation criteria, mesh optimization, adaptive mesh construction and parallel meshing techniques. This new edition has been comprehensively updated and also includes a new chapter on mobile or deformable meshes.

Spatial point processes are mathematical models used to describe and analyse the geometrical structure of patterns formed by objects that are irregularly or randomly distributed in one-, two- or three-dimensional space. Examples include locations of trees in a forest, blood particles on a glass plate, galaxies in the universe, and particle centres in samples of material. Numerous aspects of the nature of a specific spatial point pattern may be described using the appropriate statistical methods. Statistical Analysis and Modelling of Spatial Point Patterns provides a practical guide to the use of these specialised methods. The application-oriented approach helps demonstrate the benefits of this increasingly popular branch of statistics to a broad audience. The book: Provides an introduction to spatial point patterns for researchers across numerous areas of application Adopts an extremely accessible style, allowing the non-statistician complete understanding Describes the process of extracting knowledge from the data, emphasising the marked point process Demonstrates the analysis of complex datasets, using applied examples from areas including biology, forestry, and materials science Features a supplementary website containing example datasets. Statistical Analysis and Modelling of Spatial Point Patterns is ideally suited for researchers in the many areas of application, including environmental statistics,

ecology, physics, materials science, geostatistics, and biology. It is also suitable for students of statistics, mathematics, computer science, biology and geoinformatics.

Numerical Methods and Advanced Simulation in Biomechanics and Biological Processes covers new and exciting modeling methods to help bioengineers tackle problems for which the Finite Element Method is not appropriate. The book covers a wide range of important subjects in the field of numerical methods applied to biomechanics, including bone biomechanics, tissue and cell mechanics, 3D printing, computer assisted surgery and fluid dynamics. Modeling strategies, technology and approaches are continuously evolving as the knowledge of biological processes increases. Both theory and applications are covered, making this an ideal book for researchers, students and R&D professionals. Provides non-conventional analysis methods for modeling Covers the Discrete Element Method (DEM), Particle Methods (PM), MeshLess and MeshFree Methods (MLMF), Agent-Based Methods (ABM), Lattice-Boltzmann Methods (LBM) and Boundary Integral Methods (BIM) Includes contributions from several world renowned experts in their fields Compares pros and cons of each method to help you decide which method is most applicable to solving specific problems This book includes a selection of articles from The 2019 World Conference on Information Systems and Technologies (WorldCIST'19), held from April 16 to 19, at La Toja, Spain. WorldCIST is a global forum for researchers and practitioners to present and discuss recent results and innovations, current trends, professional experiences and challenges in modern information systems and technologies research, together with their technological development and applications. The book covers a number of topics, including A) Information and Knowledge Management; B) Organizational Models and Information Systems; C) Software and Systems Modeling; D) Software Systems, Architectures, Applications and Tools; E) Multimedia Systems and Applications; F) Computer Networks, Mobility and Pervasive Systems; G) Intelligent and Decision Support Systems; H) Big Data Analytics and Applications; I) Human-Computer Interaction; J) Ethics, Computers & Security; K) Health Informatics; L) Information Technologies in Education; M) Information Technologies in Radiocommunications; and N) Technologies for Biomedical Applications. This book constitutes the refereed proceedings of the 9th International Conference on Functional Imaging and Modeling of the Heart, held in Toronto, ON, Canada, in June 2017. The 48 revised full papers were carefully reviewed and selected from 63 submissions. The focus of the papers is on following topics: novel imaging and analysis methods for myocardial tissue characterization and remodeling; advanced cardiac image analysis tools for diagnostic and interventions; electrophysiology: mapping and biophysical modeling; biomechanics and flow: modeling and tissue property measurements.

This book constitutes the refereed proceedings of the First International Workshop on Simulation and Synthesis in Medical Imaging, held in conjunction with MICCAI 2016, in Athens, Greece, in October 2016. The 17 revised full papers presented together in this book were carefully reviewed and selected from 21 submissions. The contributions span the following broad categories: fundamental methods for image-based biophysical modeling and image synthesis; biophysical and data-driven models of disease progression or organ development; biophysical and data-driven models of organ motion and deformation; biophysical and data-driven models of image formation and acquisition; segmentation/registration across or within modalities to aid the learning of model parameters; cross modality (PET/MR, PET/CT, CT/MR, etc.) image synthesis; simulation and synthesis from large-scale image databases; automated techniques for quality assessment of simulations and synthetic images; as well as several applications of image synthesis and simulation in medical imaging such as image registration and segmentation; image denoising and information fusion; image reconstruction from sparse data or sparse views; and real-time simulation of biophysical properties. The papers were divided into two general topics named "simulation based approaches for medical imaging" and "synthesis and its applications in computational medical imaging".

This volume presents the proceedings of CLABIO 2015 - II Latin American Conference on Bioimpedance, held in Montevideo, Uruguay - September 30 - October 02, 2015. The works cover a broad range in Biomedical Engineering and Computing, Medical Physics and Medical Sciences, Environment, Biology and Chemistry. The topics are: ·Bioimpedance Applications ·Bioimpedance Instrumentation ·Body and Tissue Composition ·Cell Culture and Cell Suspension ·Electrical Impedance Tomography ·Electrode Modelling ·Magnetic Induction - Electrical Impedance Tomography ·Magnetic Resonance - Electrical Impedance Tomography ·Nonlinear Phenomena ·Organ and Tissue Impedance ·Plant Tissue Impedance ·Skin Impedance Modelling ·Technological Advances in Bioimpedance ·Theory and Modelling

Technological advancement in graphics and other human motion tracking hardware has promoted pushing "virtual reality" closer to "reality" and thus usage of virtual reality has been extended to various fields. The most typical fields for the application of virtual reality are medicine and engineering. The reviews in this book describe the latest virtual reality-related knowledge in these two fields such as: advanced human-computer interaction and virtual reality technologies, evaluation tools for cognition and behavior, medical and surgical treatment, neuroscience and neuro-rehabilitation, assistant tools for overcoming mental illnesses, educational and industrial uses. In addition, the considerations for virtual worlds in human society are discussed. This book will serve as a state-of-the-art resource for researchers who are interested in developing a beneficial technology for human society.

Geometry processing, or mesh processing, is a fast-growing area of research that uses concepts from applied mathematics, computer science, and engineering to design efficient algorithms for the acquisition, reconstruction, analysis, manipulation, simulation, and transmission of complex 3D models. Applications of geometry processing algorithms already cover a wide range of areas from multimedia, entertainment, and classical computer-aided design, to biomedical computing, reverse engineering, and scientific computing. Over the last several years, triangle meshes have become increasingly popular, as irregular triangle meshes have developed into a valuable alternative to traditional spline surfaces. This book discusses the whole geometry processing pipeline based on triangle meshes. The pipeline starts with data input, for example, a model acquired by 3D scanning techniques. This data can then go through processes of error removal, mesh creation, smoothing, conversion, morphing, and more. The authors detail techniques for those processes using triangle meshes. A supplemental website contains downloads and additional information.

Biomedical Engineering is an exciting and emerging interdisciplinary field that combines engineering with life sciences. The relevance of this area can be perceived in our everyday lives every time we go to hospital, receive medical treatment or even when we buy health products such as an automatic blood pressure monitor device. Over the past years we have experienced a great technological development in health care and this is due to the joint work of engineers, mathematicians, physicians, computer scientists and many other professionals. This book introduces a collection of papers organized into three sections that provide state of the art examples of practical applications in Biomedical Engineering in the area of Biomedical Signal Processing and Modelling, Biomaterials and Prosthetic Devices, and Biomedical Image Processing.