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Computational Biomechanics for Medicine: Solid and fluid mechanics for the benefit of patients contributions and papers from the MICCAI Computational Biomechanics for Medicine Workshop help in conjunction with Medical Image Computing and Computer Assisted Intervention conference (MICCAI 2020) in Lima, Peru. The content is dedicated to research in the field of methods and applications of computational biomechanics to medical image analysis, image-guided surgery, surgical simulation, surgical intervention planning, disease prognosis and diagnostics, analysis of injury mechanisms, implant and prostheses design, as well as artificial organ design and medical robotics. This book appeals to researchers, students and professionals in the field. This book contains contributions from computational biomechanics specialists who present and exchange opinions on the opportunities for applying their techniques to computer-integrated medicine, including computer-aided surgery and diagnostic systems. Computational Biomechanics for Medicine

collects peer-reviewed chapters from the annual Computational Biomechanics for Medicine Workshop, in conjunction with the Medical Image Computing and Computer Assisted Intervention [MICCAI] Society conference. The works are dedicated to research in the field of methods and applications of computational biomechanics to medical image analysis, image-guided surgery, surgical simulation, surgical intervention planning, disease diagnosis and prognosis, analysis of injury mechanisms, implant and prosthesis design, artificial organ design, and medical robotics. These chapters will appeal to a wide range of researchers and students within the fields of engineering and medicine, as well as those working in computational science. Tele Aviv Univ., Ramat Aviv, Israel. Clinical reference presents guidance on applying biomechanical principles to daily practice. Explains fundamental concepts, analyzes mechanical interactions of various tissue systems, and demonstrates the applications of biomechanics in various clinical areas. Includes more than 200 illustrations. (Product Description) One of the greatest challenges for mechanical engineers is to extend the success of computational mechanics to fields outside traditional engineering, in particular to biology, biomedical sciences, and medicine. This book is an opportunity for computational biomechanics specialists to present and exchange opinions on the opportunities of applying their techniques to computer-integrated medicine. Computational Biomechanics for Medicine: Models, Algorithms and Implementation collects the papers from the Seventh Computational Biomechanics for Medicine Workshop held in Nice in conjunction with the Medical Image Computing and Computer Assisted Intervention conference. The topics covered include: medical image analysis, image-guided surgery, surgical simulation, surgical intervention planning, disease prognosis and diagnostics, injury mechanism analysis, implant and prostheses design, and medical robotics. Learn the principles of biomechanics that will help you improve patient care and further your understanding of the various aspects of musculoskeletal systems. This book examines the principles of mechanical engineering essential to the musculoskeletal system, and makes these concepts relevant to medical professionals and others who may not have the mathematical background of an engineer. Each biomechanical principle is described in five basic steps: definition; description; lay examples; clinical examples; and explanatory notes. Through this well-illustrated, cohesive discussion of biomechanics, you'll find an understandable and logical approach to the musculoskeletal system that will enhance any practice. Logical organization makes the material easy to understand, and terms and principles can be easily located for review or reference. Each term and principle is presented with a clear, consistent, 5-step format: definition; description; lay examples; clinical examples; and explanatory notes. Important principles are presented and explained through examples, giving the reader a concrete understanding of key concepts. High-quality figures make principles accessible to readers with a non-technical background. Covers a wide range of subjects, from traditional biomechanics to material and vibrations, for relevant information in a single source. A small author team, rather than a large number of contributors, brings coherence and consistency One of the greatest challenges for mechanists is to extend the success of computational mechanics to fields outside traditional engineering, in particular to biology, biomedical sciences, and medicine. The proposed workshop will provide an opportunity for computational

biomechanics specialists to present and exchange opinions on the opportunities of applying their techniques to computer-integrated medicine. These are peer-reviewed proceedings of the workshop affiliated to a major international research conference (Medical Image Computing and Computer Assisted Intervention MICCAI 2010 in Beijing) dedicated to research in the field of medical image computing and computer assisted medical interventions. The list of subjects covered include: medical image analysis, image-guided surgery, surgical simulation, surgical intervention planning, disease prognosis and diagnostics, injury mechanism analysis, implant and prostheses design, medical robotics. Biomechanics of Spine Stabilization bridges the gap that has existed between the physics of biomechanical research and the clinical arena. The book helps surgeons to plan treatments for the injured spine based on sound biomechanical principles -- principles that will influence the surgeon's choice for the surgical approach, type of fusion, and type of instrumentation. Biomechanics of Spine Stabilization begins with the essentials, proceeds gradually toward the development of an understanding of biomechanical principles, and finally, provides a basis for clinical decision-making. These features make it a cover-to-cover "must-read" for anyone who is involved with the care of a patient with an unstable spine. Biomechanics in Sport is a unique reference text prepared by the leading world experts in sport biomechanics. Over thirty chapters cover a broad spectrum of topics, ranging from muscle mechanics to injury prevention, and from aerial movement to wheelchair sport. The biomechanics of sports including running, skating, skiing, swimming, jumping in athletics, figure skating, ski jumping, diving, javelin and hammer throwing, shot putting, and striking movements are all explained. The Computational Biomechanics for Medicine titles provide an opportunity for specialists in computational biomechanics to present their latest methodologies and advancements. This volume comprises eighteen of the newest approaches and applications of computational biomechanics, from researchers in Australia, New Zealand, USA, UK, Switzerland, Scotland, France and Russia. Some of the interesting topics discussed are: tailored computational models; traumatic brain injury; soft-tissue mechanics; medical image analysis; and clinically-relevant simulations. One of the greatest challenges facing the computational engineering community is to extend the success of computational mechanics to fields outside traditional engineering, in particular to biology, the biomedical sciences, and medicine. We hope the research presented within this book series will contribute to overcoming this grand challenge. This book presents contributions from the MICCAI 2021 Computational Biomechanics for Medicine Workshop. "Computational Biomechanics for Medicine - towards translation and better patient outcomes” comprises papers accepted for the MICCAI Computational Biomechanics for Medicine Workshop held virtually in conjunction with Medical Image Computing and Computer Assisted Intervention conference 2021, based in Strasbourg. The content focuses on methods and applications of computational biomechanics to medical image analysis, image-guided surgery, surgical simulation, surgical intervention planning, disease prognosis and diagnostics, analysis of injury mechanisms, implant and prostheses design, as well as artificial organ design and medical robotics. This book details state-of-the-art progress in the above fields to researchers, students, and professionals. There is already a wealth of literature covering cumulative trauma disorders and medical management, as well as the biomechanics of manual material

handling and lower back problems. However, despite a spike in the number of work-related musculoskeletal disorders (WRMSDs) in the upper limbs—due to a sharp increase in the amount of computer-related jobs—few if any books have focused exclusively on WRMSDs, until now. Biomechanics of the Upper Limbs: Mechanics, Modeling and Musculoskeletal Injuries, Second Edition offers vital information and tools to improve analysis of external forces and their effects on the human body. This can help ergonomists better understand job stressors and the role they play in the development of disorders, enabling them to modify the work environment and educate practitioners to better control harmful situations. Using the author’s medical and engineering expertise to distill essential subject matter and useful technical data, this comprehensive text explores: Biomechanics of the upper limbs and the motor control system The structure and physiology of the human musculoskeletal and neuromuscular systems Recent research findings and solutions to various ergonomic problems Models of various components of the neuromuscular systems, as well as larger systems in the upper limbs Risk factors for disorders and tools used to identify their causes Designed as a textbook for a typical semester-long graduate-level engineering or kinesiology course, this book includes a link to an ancillary website that offers materials such as PowerPoint® slides, sample exams, and an instructor's manual with complete solutions. It also serves as a practical, up-to-date, engineering-oriented resource for researchers, industrial ergonomists, industrial hygienists, and medical professionals who require supplementary material. One of the greatest challenges facing the computational engineering community is to extend the success of computational mechanics to fields outside traditional engineering, in particular to biology, the biomedical sciences and medicine. The Computational Biomechanics for Medicine series provides an opportunity for specialists in computational biomechanics to present their latest methodologies and advancements. This 5th edition comprises nine of the latest developments in both fundamental science and patient-specific applications, from researchers in Australia, New Zealand, USA, UK, France, Ireland and China. Some of the interesting topics discussed are: cellular mechanics; tumor growth and modeling; medical image analysis and both patient-specific fluid dynamics and solid mechanic simulations. This book presents a fundamental basic overview of orthopedic biomechanics in sports medicine, with a special focus on the current methodologies used in modeling human joints, ligaments, and muscle forces. The first part discusses the principles and materials, including the use of finite element analysis (FEA) to analyze the stress-strain response in the implant-bone interface and design. The second part focuses on joint-specific biomechanics, highlighting the biomechanics of the knee and shoulder joints, their modeling, surgical techniques, and the clinical assessment of joint performance under various kinematic conditions resulting from different repair techniques. Written by international experts working at the cutting edge of their fields, this book is an easy-to-read guide to the fundamentals of biomechanics. It also offers a source of reference for readers wanting to explore new research topics, and is a valuable tool for orthopedic surgeons, residents, and medical students with an interest in orthopedic biomechanics.? Given the strong current attention of orthopaedic, biomechanical, and biomedical engineering research on translational capabilities for the diagnosis, prevention, and treatment of clinical disease

states, the need for reviews of the state-of-art and current needs in orthopaedics is very timely. Orthopaedic Biomechanics provides an in-depth review of the current knowledge of orthopaedic biomechanics across all tissues in the musculoskeletal system, at all size scales, and with direct relevance to engineering and clinical applications. Discussing the relationship between mechanical loading, function, and biological performance, it first reviews basic structure-function relationships for most major orthopedic tissue types followed by the most-relevant structures of the body. It then addresses multiscale modeling and biologic considerations. It concludes with a look at applications of biomechanics, focusing on recent advances in theory, technology and applied engineering approaches. With contributions from leaders in the field, the book presents state-of-the-art findings, techniques, and perspectives. Much of orthopaedic, biomechanical, and biomedical engineering research is directed at the translational capabilities for the "real world". Addressing this from the perspective of diagnostics, prevention, and treatment in orthopaedic biomechanics, the book supplies novel perspectives for the interdisciplinary approaches required to translate orthopaedic biomechanics to today’s real world. Every year workers' low-back, hand, and arm problems lead to time away from jobs and reduce the nation's economic productivity. The connection of these problems to workplace activities-from carrying boxes to lifting patients to pounding computer keyboards-is the subject of major disagreements among workers, employers, advocacy groups, and researchers. Musculoskeletal Disorders and the Workplace examines the scientific basis for connecting musculoskeletal disorders with the workplace, considering people, job tasks, and work environments. A multidisciplinary panel draws conclusions about the likelihood of causal links and the effectiveness of various intervention strategies. The panel also offers recommendations for what actions can be considered on the basis of current information and for closing information gaps. This book presents the latest information on the prevalence, incidence, and costs of musculoskeletal disorders and identifies factors that influence injury reporting. It reviews the broad scope of evidence: epidemiological studies of physical and psychosocial variables, basic biology, biomechanics, and physical and behavioral responses to stress. Given the magnitude of the problem-approximately 1 million people miss some work each year-and the current trends in workplace practices, this volume will be a must for advocates for workplace health, policy makers, employers, employees, medical professionals, engineers, lawyers, and labor officials. Technological advancements in the last few decades have significantly revolutionized the healthcare industry, resulting in life expectancy improvement in human beings. The use of automated machines in healthcare has reduced human errors and has notably improved disease diagnosis efficiency. Design and Development of Affordable Healthcare Technologies provides emerging research on biomedical instrumentation, bio-signal processing, and device development within the healthcare industry. This book provides insight into various subjects including patient monitoring, medical imaging, and disease classification. This book is a vital reference source for medical professionals, biomedical engineers, scientists, researchers, and medical students interested in the comprehensive research on the advancements in healthcare technologies. This volume comprises the latest developments in both fundamental science and patient-specific applications, discussing topics such as: cellular mechanics; injury biomechanics;

biomechanics of heart and vascular system; medical image analysis; and both patient-specific fluid dynamics and solid mechanics simulations. With contributions from researchers world-wide, the Computational Biomechanics for Medicine series of titles provides an opportunity for specialists in computational biomechanics to present their latest methodologies and advancements. Following on from the successful Biomechanics and Medicine in Swimming VI proceedings which covered the conference held in Liverpool, this book contains all twelve of the keynote addresses and selected, edited and revised papers presented at the Swimming Science VII conference in Atlanta. Leading international experts have contributed state-of-the-art research on the subject. Biomechanics and Gait Analysis presents a comprehensive book on biomechanics that focuses on gait analysis. It is written primarily for biomedical engineering students, professionals and biomechanists with a strong emphasis on medical devices and assistive technology, but is also of interest to clinicians and physiologists. It allows novice readers to acquire the basics of gait analysis, while also helping expert readers update their knowledge. The book covers the most up-to-date acquisition and computational methods and advances in the field. Key topics include muscle mechanics and modeling, motor control and coordination, and measurements and assessments. This is the go to resource for an understanding of fundamental concepts and how to collect, analyze and interpret data for research, industry, clinical and sport. Details the fundamental issues leading to the biomechanical analyses of gait and posture Covers the theoretical basis and practical aspects associated with gait analysis Presents methods and tools used in the field, including electromyography, signal processing and spectral analysis, amongst others Orthopedic Biomechanics sheds light on an important and interesting discipline at the interface between medical and natural sciences. Understanding the effects of mechanical influences on the human body is the first step toward developing innovative treatment and rehabilitation concepts for orthopedic disorders. This book provides valuable information on the forces acting on muscles, tendons, and bones. Beginning with the step-by-step fundamentals of physics and mechanics, it goes on to cover the function and loading of joints, movement in two- and three-dimensions, and the properties of biological tissues. This book explains the practical importance of biomechanics, including special chapters addressing the mechanical causes of disk prolapse, load on the spine in sitting and standing positions, and the correlation between mechanical loading and bone density. Key Features: Limited use of complex vector equations while providing in-depth treatment analysis Exquisitely illustrated, detailed descriptions of the mechanical aspects of every major joint in the body: hip, shoulder, knee, and lumbar spine Extensive references for further information Valuable appendixes describing the interaction between mechanical and biological functions as well as mathematical tools necessary to understand technically demanding concepts This book also analyzes techniques for changing the effects on bones and joints through therapy, training, external aids, modified behavior, and ergonomic improvements. An essential resource for orthopedists and physical therapists alike, it will help you understand past and current scientific work in the field and how to apply state-of-the-art solutions to the problems you'll encounter on a daily basis. One of the greatest challenges for mechanical engineers is to extend the success of computational mechanics to fields outside traditional engineering, in

particular to biology, biomedical sciences, and medicine. This book is an opportunity for computational biomechanics specialists to present and exchange opinions on the opportunities of applying their techniques to computer-integrated medicine. Computational Biomechanics for Medicine: Deformation and Flow collects the papers from the Medical Image Computing and Computer Assisted Intervention conference (MICCAI 2011) dedicated to research in the field of medical image computing and computer assisted medical interventions. The topics covered include: medical image analysis, image-guided surgery, surgical simulation, surgical intervention planning, disease prognosis and diagnostics, injury mechanism analysis, implant and prostheses design, and medical robotics. The International Symposium on Biomechanics and Medicine in Swimming, held every four years under the aegis of the International Society of Biomechanics and the World Commission of Sports Biomechanics, provides a forum in which research related to swimming is reported and problems that confront swimming practitioners are debated. This volume contains the papers presented at the sixth symposium. The keynote addresses covered lactate metabolism, performance determining factors and the analysis of sprint swimming. The contributed papers range widely across sports science, coaching and training and sports medicine. This volume comprises the latest developments in both fundamental science and patient-specific applications, discussing topics such as: cellular mechanics, injury biomechanics, biomechanics of the heart and vascular system, algorithms of computational biomechanics for medical image analysis, and both patient-specific fluid dynamics and solid mechanics simulations. With contributions from researchers world-wide, Computational Biomechanics for Medicine: Measurments, Models, and Predictions provides an opportunity for specialists in the field to present their latest methodologies and advancements. Basic Biomechanics provides an introduction to biomechanics using the latest findings from the research literature to support and exemplify the concepts presented. Quantitative as well as qualitative examples of problems illustrate biomechanical principles. Quantitative aspects are presented in a manageable, progressive fashion to make biomechanical principles accessible to all students, regardless of their mathematical skills. Computational biomechanics is an emerging research field that seeks to understand the complex biomechanical behaviors of normal and pathological human joints to come up with new methods of orthopedic treatment and rehabilitation. Computational Biomechanics of the Musculoskeletal System collects the latest research and cutting-edge techniques used in computational biomechanics, focusing on orthopedic and rehabilitation engineering applications. The book covers state-of-the-art techniques and the latest research related to computational biomechanics, in particular finite element analysis and its potential applications in orthopedics and rehabilitation engineering. It offers a glimpse into the exciting potentials for computational modeling in medical research and biomechanical simulation. The book is organized according to anatomical location—foot and ankle, knee, hip, spine, and head and teeth. Each chapter details the scientific questions/medical problems addressed by modeling, basic anatomy of the body part, computational model development and techniques used, related experimental studies for model setup and validation, and clinical applications. Plenty of useful biomechanical information is provided for a variety of applications, especially for the optimal design of body

support devices and prosthetic implants. This book is an excellent resource for engineering students and young researchers in bioengineering. Clinicians involved in orthopedics and rehabilitation engineering may find this work to be both informative and highly relevant to their clinical practice. This book presents the proceedings of the “International Conference of the Polish Society of Biomechanics – BIOMECHANICS 2018” held in Zielona Góra, Poland from September 5 to 7, 2018, and discusses recent research on innovations in biomechanics. It includes a collection of selected papers in all key areas of biomechanics, including cellular, molecular, neuro and musculoskeletal biomechanics, as well as sport, clinical and rehabilitation biomechanics. These themes are extremely important in the development of engineering concepts and methods to provide new medical solutions, especially in the context of an ageing population. Presenting the latest technical advances and research methods used in clinical biomechanics, this book is of interest to scientists as well as junior researchers and students of interdisciplinary fields of engineering, medical, and sports sciences. This book focuses on particular mental and physical aspects of women’s health, presenting topics concerning the pelvis and pelvic floor dysfunction and the breast during a woman’s life, such as rehabilitation for pelvic and breast disorders, and the benefits of biomechanical analysis in treating these conditions. With each chapter providing a brief survey of a major research area related to the theme, the book offers an integrated overview of topics such as the bio-psycho-social model of women’s health, pelvic floor evaluation in sports, the breast, pregnancy and delivery. It is a valuable resource for a wide range of readers, including researchers, graduates and professionals. "Smart Materials in Structural Health Monitoring, Control and Biomechanics" presents the latest developments in structural health monitoring, vibration control and biomechanics using smart materials. The book mainly focuses on piezoelectric, fibre optic and ionic polymer metal composite materials. It introduces concepts from the very basics and leads to advanced modelling (analytical/ numerical), practical aspects (including software/ hardware issues) and case studies spanning civil, mechanical and aerospace structures, including bridges, rocks and underground structures. This book is intended for practicing engineers, researchers from academic and R&D institutions and postgraduate students in the fields of smart materials and structures, structural health monitoring, vibration control and biomedical engineering. Professor Chee-Kiong Soh and Associate Professor Yaowen Yang both work at the School of Civil and Environmental Engineering, Nanyang Technological University, Singapore. Dr. Suresh Bhalla is an Associate Professor at the Department of Civil Engineering, Indian Institute of Technology Delhi, India. From the reviews of the Second Edition: "[This book] represents a distillation of the authors' combined years of experience in applying biomechanics in various industries and work situations . . . I recommend this book to anyone, regardless of discipline, who is interested in understanding the many biomechanical factors which must be considered when trying to effect the prevention and reduction of musculoskeletal injuries in the workplace." -Journal of Biomechanics. "Impressive descriptions of biomechanical concepts and worksite considerations . . . based not only on mechanical and mathematical principles, but on solid anatomical and physiologic constructs . . . a very valuable reference source." -Research Communications in Chemical Pathology and Pharmacology. Now in its third edition, this

volume stands as the definitive text on occupational biomechanics-a science dealing with the physiological loads and stresses placed on the musculoskeletal system during physical work. It expertly weaves engineering and medical information from diverse sources and provides a coherent treatment of the biomechanical principles underlying the well-designed and ergonomically sound workplace. In this revision, the authors update the state of current knowledge in several key areas, including epidemiological support of occupational biomechanics, mechanical aspects of muscle actions during work, biomechanical models of exertions, postural-analysis methods, materials and load-handling evaluation methods, guidelines for various types of work, design considerations of VDT workstations, hand tools, and more. Complete with 75 new illustrations and over 200 new references, Occupational Biomechanics is an excellent one-stop reference for students and professionals in industrial engineering, product and process design, medicine, and occupational health and safety. The IXth International World Symposium on Biomechanics and Medicine in Swimming was held in Saint-Etienne in France from June 21 - 23 2002, under the auspices of the World Commission of Sport Biomechanics and the Steering Group of Biomechanics and Medicine in Swimming. The main conference organisers were the Laboratoire de Physiologie of the Medical Faculty and Service d'Exploration Fonctionnelle Cardio-Respiratoire et Médecine du Sport of Saint-Etienne Hospital. The conference was a joint effort with several other organisations as well. The Department of Physical Education of the University of Saint-Etienne, the City of Saint-Etienne, the Conseil Général de la Loire, the Conseil régional Rhône-Alpes, the Association des Chercheurs en Activités Physiques et Sportives, the French Swimming Federation, the INSERM, the Ministry of Foreign Affairs, the Société de la Loire de Médecine du Sport and the société française de Médecine du Sport were the main public sponsors of the Symposium. This book is a compilation of chapters that discuss the most vital concepts and emerging trends in the fields of sports biomechanics and medicine. Sports biomechanics is a branch of biomechanics that applies the law of mechanics, physics and principles of biology on human movement and actions especially related to sports. It understands the cause and effect relationship of the human body movement. Sports medicine on the other hand deals with curing and preventing sports injuries as quickly as possible. Both of them try to optimize the performance of an athlete by providing the required guidance, equipment and drugs. While understanding the long-term perspectives of the topics, this book makes an effort in highlighting their impact as a modern tool for the growth of the discipline. The topics covered herein offer the readers new insights in the field of sports biomechanics. It covers theoretical and experimental studies in this field which elucidate some of the crucial and unexplored concepts. Researchers and students involved in the area of sports biomechanics will be assisted by this book. Digital models based on data from medical images have recently become widespread in the field of biomechanics. This book summarizes medical imaging techniques and processing procedures, both of which are necessary for creating bone models with finite element methods. Chapter 1 introduces the main principles and the application of the most commonly used medical imaging techniques. Chapter 2 describes the major methods and steps of medical image analysis and processing. Chapter 3 presents a brief review of recent studies on reconstructed finite element bone

models, based on medical images. Finally, Chapter 4 reveals the digital results obtained for the main bone sites that have been targeted by finite element modeling in recent years. This book provides a state-of-the-art look at the applied biomechanics of accidental injury and prevention. The editors, Drs. Narayan Yoganandan, Alan M. Nahum and John W. Melvin are recognized international leaders and researchers in injury biomechanics, prevention and trauma medicine. They have assembled renowned researchers as authors for 29 chapters to cover individual aspects of human injury assessment and prevention. This third edition is thoroughly revised and expanded with new chapters in different fields. Topics covered address automotive, aviation, military and other environments. Field data collection; injury coding/scaling; injury epidemiology; mechanisms of injury; human tolerance to injury; simulations using experimental, complex computational models (finite element modeling) and statistical processes; anthropomorphic test device design, development and validation for crashworthiness applications in topics cited above; and current regulations are covered. Risk functions and injury criteria for various body regions are included. Adult and pediatric populations are addressed. The exhaustive list of references in many areas along with the latest developments is valuable to all those involved or intend to pursue this important topic on human injury biomechanics and prevention. The expanded edition will interest a variety of scholars and professionals including physicians, biomedical researchers in many disciplines, basic scientists, attorneys and jurists involved in accidental injury cases and governmental bodies. It is hoped that this book will foster multidisciplinary collaborations by medical and engineering researchers and academicians and practicing physicians for injury assessment and prevention and stimulate more applied research, education and training in the field of accidental-injury causation and prevention. ALL-ENCOMPASSING and EXPANDED, now covering the WHOLE BODY (lower quadrant PLUS upper quadrant and spine) – The Comprehensive Textbook of Clinical Biomechanics (formerly Biomechanics in Clinic and Research) presents the latest research in a form which is accessible, practical, thorough and up-to-the minute. • Starts from basic principles and builds up to complex concepts • Highly practical with a constant clinical emphasis • Written for all health care professionals including physiotherapists and podiatrists • Addition of upper quadrant and spine • Title has changed to truly reflect the resource’s expanded and comprehensive approach • Case studies and additional clinical examples • New methods in EMG analysis • Updated elearning course which is compatible with tablet and mobile devices • A global team of writers Biomechanics applies the principles and rigor of engineering to the mechanical properties of living systems. This book integrates the classic fields of mechanics--statics, dynamics, and strength of materials--using examples from biology and medicine. Fundamentals of Biomechanics is excellent for teaching either undergraduates in biomedical engineering programs or health care professionals studying biomechanics at the graduate level. Extensively revised from a successful first edition, the book features a wealth of clear illustrations, numerous worked examples, and many problem sets. The book provides the quantitative perspective missing from more descriptive texts, without requiring an advanced background in mathematics. It will be welcomed for use in courses such as biomechanics and orthopedics, rehabilitation and industrial engineering, and occupational or sports medicine. Human biomechanics is an

important research field in achieving safety, health, comfort, and a high quality of life in a world where the older generation soon will outnumber the younger generation. Recently there have been significant developments in this new field ofresearch, addressing such issues as injury prevention in various types of accidents, the causes of human bodily dysfunction, function recovery through medical care and training, and func tional reinforcement by sports. These issues are studied on the basis of the biomechanics of the cells, tissues, organs, and systems of the human body. To achieve the aim of providing support for better lives from the aspect of mechanical engineering, the Human Life Support Biomechanics Endowed Chair at the Graduate School of Engineering at Nagoya University was established more than 3 years ago with a donation from the Toyota Motor Corporation. Since that time, we have been conducting intensive research in the field as well as trying to publicize our work in Japan. The results of our research have been presented at conferences both at home and abroad. We have also en deavored to underscore the importance of the field by organizing symposiums with carefully designed programs. This book contains fourteen chapters dealing with various aspects of the biomechanics of today. The topics covered are glimpses of what modern biomechanics can offer scientists, students, and the general public. We hope this book can be inspiring, helpful, and interesting for many readers who are not necessarily concerned with biomechanics daily.