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Nota di contenuto	Part I Protein and Cell Mechanics: 1 Towards a Coarse-Grained Model for Unfolded Proteins, by Ali Ghavami, Erik Van der Giessen, Patrick R. Onck -- 2 Modeling Collagen-Proteoglycan Structural Interactions in the Human Cornea , by Xi Cheng, Hamed Hatami-Marbini, Peter M. Pinsky -- 3 Simulations of Cell Behavior on Substrates of Variegated Stiffness and Architecture , by Amit Pathak, Vikram S. Deshpande, Anthony G. Evans, Robert M. McMeeking -- Part II Muscle Mechanics: 4 A Mathematical Approach for Studying Ca <sup>2+</sup> –Regulated Smooth Muscle Contraction, by Saeil C. Murtada, Gerhard A. Holzapfel -- 5 A Coupled Chemomechanical Model for Smooth Muscle Contraction , by Markus Böl, Andre Schmitz -- 6 Modeling of Smooth Muscle Activation , by Jonas Stålhand, Anders Klarbring, Gerhard A. Holzapfel -- 7 A Cross-Bridge Model Describing the Mechanoenergetics of Actomyosin Interaction , by Mari Kalda, Pearu Peterson, Jüri Engelbrecht, Marko Vendelin -- 8 Multiscale Skeletal Muscle Modeling: From Cellular Level to a Multi-Segment Skeletal Muscle Model of the Upper Limb , by Oliver

Röhrle, Michael Sprenger, Ellankavi Ramasamy, Thomas Heidlauf -- Part III Cardiovascular Mechanics: 9 Multiscale Modeling of Arterial Adaptations: Incorporating Molecular Mechanisms within Continuum Biomechanical Models, by Jay D. Humphrey -- 10 Cardiovascular Tissue Damage: An Experimental and Computational Framework, by Nele Famaey, Ellen Kuhl, Gerhard A. Holzapfel, Jos Vander Sloten -- 11 Mechanical Properties of Ascending Thoracic Aortic Aneurysm (ATAA): Association with Valve Morphology, by Salvatore Pasta, Julie A. Phillipi, Thomas G. Gleason, David A. Vorp -- 12 Intracranial Aneurysms: Modeling Inception and Enlargement, by Paul N. Watton, Haoyu Chen, Alisa Selimovic, Harry Thompson, Yiannis Ventikos -- 13 Micro-Structurally Based Kinematic Approaches to Electromechanics of the Heart, by Serdar Göktepe, Andreas Menzel, Ellen Kuhl -- 14 Activation Models for the Numerical Simulation of Cardiac Electromechanical Interactions, by Ricardo Ruiz-Baier, Davide Ambrosi, Simone Pezzuto, Simone Rossi, Alfio Quarteroni -- 15 Hemodynamic Alterations Associated with Coronary and Cerebral Arterial Remodeling Following a Surgically-Induced Aortic Coarctation, by C. Alberto Figueroa, Jessica S. Coogan, Jay D. Humphrey -- 16 Patient-Specific Surgery Planning for the Fontan Procedure, by Christopher M. Haggerty, Lucia Mirabella, Maria Restrepo, Diane A. de Zélicourt, Jarek Rossignac, Fotis Sotiropoulos, Thomas L. Spray, Kirk R. Kanter, Mark A. Fogel, Ajit P. Yoganathan -- Part IV Multiphasic Models: 17 Finite Element Modeling of Solutes in Hydrated Deformable Biological Tissues, by Gerard A. Ateshian, Jeffrey A. Weiss -- 18 Reformulation of Mixture Theory-Based Poroelasticity for Interstitial Tissue Growth, by Stephen C. Cowin -- 19 Constitutive and Computational Aspects in Tumor Therapies of Multiphasic Brain Tissue, by Wolfgang Ehlers, Arndt Wagner -- 20 A Biphasic 3D-FEM Model for the Remodeling of Microcirculation in Liver Lobes, by Tim Ricken, Uta Dahmen, Olaf Dirsch, Daniel Q. Werner -- 21 Multiphysics Modeling of Reactions, Mass Transport and Mechanics of Tumor Growth, by Shiva Rudraraju, Kristen L. Mills, Ralf Kemkemer, Krishna Garikipati -- 22 Multicompartmental Poroelasticity as a Platform for the Integrative Modeling of Water Transport in the Brain, by John C. Vardakis, Brett J. Tully, Yiannis Ventikos -- 23 Discontinuous Versus Continuous Chemical Potential Across a Crack in a Swelling Porous Medium, by Jacques M. Huyghe, Famke Kraaijeveld, Joris J.C. Remmers, René de Borst -- Part V Morphogenesis, Biological Tissues and Organs: 24 Mechanisms of Brain Morphogenesis, by Benjamin A. Filas, Gang Xu, Larry A. Taber -- 25 A Micromechanical Viscoelastic Constitutive Model for Native and Engineered Anterior Cruciate Ligaments, by Jinjin Ma, Ellen M. Arruda -- 26 Mechanical Characterization of the Human Liver, by Marc Hollenstein, Edoardo Mazza -- 27 In Vivo Validation of Predictive Models for Bone Remodeling and Mechanobiology, by Alina Levchuk, Ralph Müller -- 28 Bridging Scales in Respiratory Mechanics, by Lena Yoshihara, Mahmoud Ismail, Wolfgang A. Wall -- Index.

## Sommario/riassunto

This book contains a collection of papers that were presented at the IUTAM Symposium on "Computer Models in Biomechanics: From Nano to Macro" held at Stanford University, California, USA, from August 29 to September 2, 2011. It contains state-of-the-art papers on: - Protein and Cell Mechanics: coarse-grained model for unfolded proteins, collagen-proteoglycan structural interactions in the cornea, simulations of cell behavior on substrates - Muscle Mechanics: modeling approaches for  $\text{Ca}^{2+}$ -regulated smooth muscle contraction, smooth muscle modeling using continuum thermodynamical frameworks, cross-bridge model describing the mechanoenergetics of actomyosin interaction, multiscale skeletal muscle modeling - Cardiovascular

Mechanics: multiscale modeling of arterial adaptations by incorporating molecular mechanisms, cardiovascular tissue damage, dissection properties of aortic aneurysms, intracranial aneurysms, electromechanics of the heart, hemodynamic alterations associated with arterial remodeling following aortic coarctation, patient-specific surgery planning for the Fontan procedure - Multiphasic Models: solutes in hydrated biological tissues, reformulation of mixture theory-based poroelasticity for interstitial tissue growth, tumor therapies of brain tissue, remodeling of microcirculation in liver lobes, reactions, mass transport and mechanics of tumor growth, water transport modeling in the brain, crack modeling of swelling porous media - Morphogenesis, Biological Tissues and Organs: mechanisms of brain morphogenesis, micromechanical modeling of anterior cruciate ligaments, mechanical characterization of the human liver, in vivo validation of predictive models for bone remodeling and mechanobiology, bridging scales in respiratory mechanics.

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