

Contents

Section I Biofluids and Mass Transport

1 Immersed Boundary/Continuum Methods	3
X. Sheldon Wang	
2 Computational Modeling of ATP/ADP Concentration at the Vascular Surface	49
Hyo Won Choi and Abdul I. Barakat	
3 Development of a Lattice-Boltzmann Method for Multiscale Transport and Absorption with Application to Intestinal Function	69
Yanxing Wang, James G. Brasseur, Gino G. Banco, Andrew G. Webb, Amit C. Ailiani, and Thomas Neuberger	

Section II Cardiovascular Biomechanics

4 Computational Models of Vascular Mechanics	99
Joseph R. Leach, Mohammad R. Kaazempur Mofrad, and David Saloner	
5 Computational Modeling of Vascular Hemodynamics	171
Vitaliy L. Rayz and Stanley A. Berger	
6 Computational Modeling of Coronary Stents	207
Henry Y. Chen and Ghassan S. Kassab	
7 Computational Modeling of Aortic Heart Valves	221
Laura R. Croft and Mohammad R. Kaazempur Mofrad	
8 Computational Modeling of Growth and Remodeling in Biological Soft Tissues: Application to Arterial Mechanics	253
S. Baek and J.D. Humphrey	

Section III Musculoskeletal Biomechanics

- 9 Computational Modeling of Trabecular Bone Mechanics**277
Glen L. Niebur and Tony M. Keaveny
- 10 Computational Modeling of Extravascular Flow in Bone**.....307
Melissa L. Knothe Tate, Roland Steck, Andrea Tami,
Hans-Jörg Sidler, Eric J. Anderson, and Peter Niederer
- 11 Computational Modeling of Cell Mechanics
in Articular Cartilage**329
Mansoor A. Haider, Brandy A. Benedict, Eunjung Kim,
and Farshid Guilak
- 12 Computational Models of Tissue Differentiation**353
P.J. Prendergast, S. Checa, and D. Lacroix

Section IV Soft Tissue Biomechanics

- 13 A Review of the Mathematical and Computational
Foundations of Biomechanical Imaging**.....375
Paul E. Barbone and Assad A. Oberai
- 14 Interactive Surgical Simulation Using a Meshfree
Computational Method**409
Suvranu De and Yi-Je Lim
- 15 Computational Biomechanics of the Human Cornea**435
Anna Pandolfi

Section V Biomolecular Mechanics and Multiscale Modeling

- 16 Identifying the Reaction Mechanisms of Inteins
with QM/MM Multiscale Methods**469
Philip T. Shemella and Saroj K. Nayak
- 17 Computational Scale Linking in Biological Protein
Materials**.....491
Markus J. Buehler
- 18 How to Measure Biomolecular Forces: A “Tug-of-War”
Approach**533
Wonmuk Hwang
- 19 Mechanics of Cellular Membranes**549
Ashutosh Agrawal and David J. Steigmann

- Index**567