

Contents

List of contributors	vii
Preface	xi
1 Computer technology trends <i>Marc Nyssen</i>	1
2 Modelling of biological systems	19
2a High-resolution QCT-based models of bone architecture <i>Ralph Müller</i>	20
2b Computer models of molecular structures of biomaterials <i>Keith D. Lobel, John K. West and Larry L. Hench</i>	45
2c Biomechanical modelling of blood vessels and arterial prostheses <i>Patrick Segers, Christian Oddou and Pascal Verdonck</i>	88
3 Simulation and lifetime prediction of bone-implant systems	115
3a Computer simulations of bone adaptation in orthopaedics <i>Marjolein van der Meulen and Harrie Weinans</i>	116
3b Numerical simulation of load-bearing dental implants <i>Arturo N. Natali</i>	132
3c Towards an integrated lifetime prediction software for biomaterials systems <i>Josep A. Planell</i>	149
4 The application of CAD in the design of orthopaedic implants <i>David P. Fitzpatrick and Graham H. Isaac</i>	159

5 Pre-operative planning systems for hard-tissue surgery	179
5a Computer-supported pre-surgical planning of cranial remodelling: the integration of computer-aided design technology to simulate surgical actions <i>Maurice Mommaerts, Geert Jans, Jos Vander Sloten, Remi Van Audekercke, Robert Gobin and Georges Van der Perre</i>	180
5b An image-guided planning system for endosseous oral implants <i>Kris Verstreken, Johan Van Cleynenbreugel, Daniël van Steenberghe, Guy Marchal and Paul Suetens</i>	192
5c The need of pre-operative planning for endosseous oral implants: the clinician's viewpoint <i>Daniël van Steenberghe, Marc Quirynen, Annelies Adriansen, Katia Van Wontbergem, Ignace Naert and Reinhilde Jacobs</i>	241
6 The application of robots in surgery	247
<i>Brian Davies</i>	
7 Personalisation of implants and surgical aids	261
7a A system for intra-operative manufacturing of stems of total hip replacements <i>Michiel Mulier</i>	262
7b Medical image-based personalised implants and surgical tools, using rapid prototyping technology <i>Wilfried Vancraen and Jos Vander Sloten</i>	279
Index	301