

Contents

Preface	v
Editorial Board of the BIOMAT Consortium	vii
 Cell dynamics	
Systems <i>Stem Cell</i> biology. <i>Ingo Roeder</i>	1
Emergence of a collective steady state and symmetry breaking in systems of two identical cells. <i>Rui Dilão</i>	25
Surface-reaction models of protocells. <i>Roberto Serra, Timoteo Carletti, Irene Poli</i>	37
Stability of the periodic solutions of the Schnakenberg model under diffusion. <i>Mariano R. Ricard, Yadira H. Solano</i>	53
 Modelling infectious diseases	
HIV epidemiology and the impact of nonsterilizing vaccines. <i>Ruy Ribeiro, Alan Perelson, Dennis Chao, Miles Davenport</i>	69
Mathematical and computer modeling of molecular-genetic mechanisms of liver cells infection by hepatitis B virus. <i>Bahrom R. Aliev, Bahrom N. Hidirov, Mahruy Saidalieva, Mohiniso B. Hidirova</i>	89
Modeling the geographic spread of infectious diseases using population- and individual-based approaches. <i>Lisa Sattenspiel</i>	103
Mathematical models of tuberculosis: accomplishments and future challenges. <i>Caroline Colijn, Ted Cohen, Megan Murray</i>	123
A space-time scan statistic for detection of tuberculosis outbreaks in the San Francisco homeless population. <i>Brandon Higgs, Mojdeh Mohtashemi, Jennifer Grinsdale, L. Masae Kawamura</i>	149
Dynamics of tuberculosis under dots strategy. <i>Patrícia D. Gomes, Regina Leal-Toledo, C. Cunha</i>	161
 Modelling physiological disorders	
Mathematical and computational modeling of physiological disorders: A case study of the IUPS human physiome project and aneurysmal models. <i>Tor A. Kwembe</i>	181
Linear feedback control for a mathematical model of tumor growth. <i>Jean Carlos Silveira, Elenice Weber Stiegelmeier, Gerson Feldmann, Marat Rafikov</i>	193

Heat kernel based 3d reconstruction of objects from 2d parallel contour. <i>Celestin Wafo-Soh</i>	203
Mathematical prediction of high energy metabolite gradients in mammalian cells. <i>Raymond Mejia, Ronald M. Lynch</i>	221

DNA and proteins

Ideal protein forms and their application to de-novo structure prediction. <i>Willie R. Taylor, V. Chelliah, Dan Klose, Tom Sheldon, G. J. Bartlett, Inge Jonassen</i>	231
Euclidean full Steiner trees and the modelling of biomolecular structures. <i>Rubem P. Mondaini</i>	247
Defining reduced amino acid sets with a new substitution matrix based solely on binding affinities. <i>Armin Weiser, Rudolf Volkmer, Michal Or-Guil</i>	259
Multi-objective evolutionary approach to <i>ab initio</i> protein tertiary structure prediction. <i>Telma W. de Lima, Paulo Gabriel, Alexandre Delbem, Rodrigo Faccioli, Ivan Silva</i>	269
Branching events in a GaltonWatson tree and its application to human mitochondrial DNA evolution. <i>Armando Neves, Carlos Moreira</i>	287

Population dynamics

Explorations in insect sociality: Towards a unifying approach. <i>Paulo Sávio da Silva Costa</i>	299
A stage-structured finite element model for the population dynamics of two intertidal barnacles with interspecific competition. <i>Ana Paula Rio Doce, Regina Almeida, Michel Costa</i>	327
Advances in a theory of impulsive differential equations at impulse-dependent times, with applications to bio-economics. <i>Fernando Córdova-Lepe</i>	343
Multistability on a Leslie-Gower type predator-prey model with nonmonotonic functional response. <i>Betsabé González-Yañez, Eduardo González-Olivares, Jaime Mena-Lorca</i>	359

Index	385
-------------	-----