

Harnessing Biological Complexity

[DOWNLOAD HERE](#)

1;Harnessing Biological Complexity;1 1.1;Preface;4 1.2;Contents ;7 1.3;1 Introduction;9 1.4;2 Modeling Cellular Dynamics;18 1.4.1;2.1 Ion Channels and Cellular Excitations;18 1.4.1.1;2.1.1 A Simple Open--Close Kinetics of a Channel Protein;20 1.4.2;2.2 First Encounter with Numerical Simulations of Ordinary Differential Equations;24 1.4.3;2.3 Gating of Ion Channels in the Hodgkin--Huxley Formulation;26 1.4.3.1;2.3.1 Electro-Chemical Potentials for Cell Membranes;32 1.4.3.2;2.3.2 Electric Circuit Model of Cell Membranes;36 1.4.4;2.4 Hodgkin--Huxley Formulation of Membrane Excitation;37 1.4.5;2.5 FitzHugh--Nagumo Model;45 1.4.5.1;2.5.1 More About Numerical Integrations of Ordinary Differential Equations;45 1.4.6;2.6 Examples from Cardiac Muscle Cell Models;49 1.4.7;2.7 Variety of Complex Dynamics of Ion Channels;68 1.4.8;2.8 Variety of Complex Dynamics of Cellular Excitations;76 1.4.9;2.9 Cellular Calcium Dynamics;80 1.4.10;2.10 Bridging Between Different Levels of Modeling:A Preliminary Example;83 1.5;3 Dynamics of Cellular Networks;89 1.5.1;3.1 Gap Junctions;89 1.5.2;3.2 Continuous Approximation and Reaction Diffusion Equations;91 1.5.2.1;3.2.1 Finite Difference Method for Reaction Diffusion Equations;93 1.5.2.2;3.2.2 Cable Equations and Compartment Models;93 1.5.2.3;3.2.3 Finite Element Method with Boundary Conditions for Active Transmission Lines;99 1.5.2.4;3.2.4 Excitation Conduction Through the Whole Heart;119 1.5.3;3.3 Synaptically Connected Neuronal Networks;121 1.5.3.1;3.3.1 Reciprocal Inhibition and Alternating Rhythms;127 1.6;4 Application of ISIDE to Create Models;131 1.6.1;4.1 Brief Introduction of ISML;131 1.6.2;4.2 Getting Started;132 1.6.3;4.3 Model Creations and Simulations on ISIDE;134 1.6.3.1;4.3.1 Hodgkin--Huxley Model;134 1.6.3.2;4.3.2 Modularity of a Model;136 1.6.3.3;4.3.3 Conductance Modules;138 1.6.3.4;4.3.4 Current Modules;142 1.6.3.5;4.3.5 Membrane Module;145 1.6.3.6;4.3.6 Add an External Stimulus Current Generator Model;145 1.6.3.7;4.3.7 Voltage Clamp Experiment;148 1.6.3.8;4.3.8 Replacement of Ionic Current Modules;149 1.6.4;4.4 Neural Network Model;152 1.6.4.1;4.4.1 Two-Coupled BVP Model;153 1.6.4.2;4.4.2 Three-Coupled FHN Model;161 1.6.4.3;4.4.3 Middle Scale Neuronal Network Model;168 1.6.5;4.5 Other Model Exchange Formats;186 1.6.5.1;4.5.1 From Cell to Intracellular Signaling;186 1.6.5.2;4.5.2 Yet Another Format;194 1.6.6;4.6 Integration of Morphological and Timeseries Data on an

ISML Model;195 1.6.6.1;4.6.1 Visualization of ISML Models;196 1.6.6.2;4.6.2 PDEs Solved on Morphological Data;197 1.7;5 Key Concepts of insilicoML;201 1.7.1;5.1 Overview of Model Representation in ISML;201 1.7.2;5.2 Expressions Used in ISML 1.0 ;204 1.7.2.1;5.2.1 Modularity and Linkage Among Modules;204 1.7.2.2;5.2.2 Edge;206 1.7.2.3;5.2.3 Module;206 1.7.2.4;5.2.4 Port;207 1.7.2.5;5.2.5 Physical-Quantity;207 1.7.2.6;5.2.6 Capsulation;209 1.7.3;5.3 SBML--ISML Hybridization;209 1.7.4;5.4 Morphological Data and Mathematical Expressions;212 1.7.4.1;5.4.1 Morphology;213 1.7.4.2;5.4.2 Partial Differential Equation;216 1.7.5;5.5 Databasing, Tracking, and Relating Models;220 1.8;References;223 1.9;Index;226 EAN/ISBN : 9784431538806 Publisher(s): Springer, Berlin, Springer Japan Discussed keywords: Bioinformatik, Biologische Medizin Format: ePub/PDF Author(s): Nomura, Taishin - Asai, Yoshiyuki

[DOWNLOAD HERE](#)

Similar manuals:

[Harnessing Biological Complexity](#)