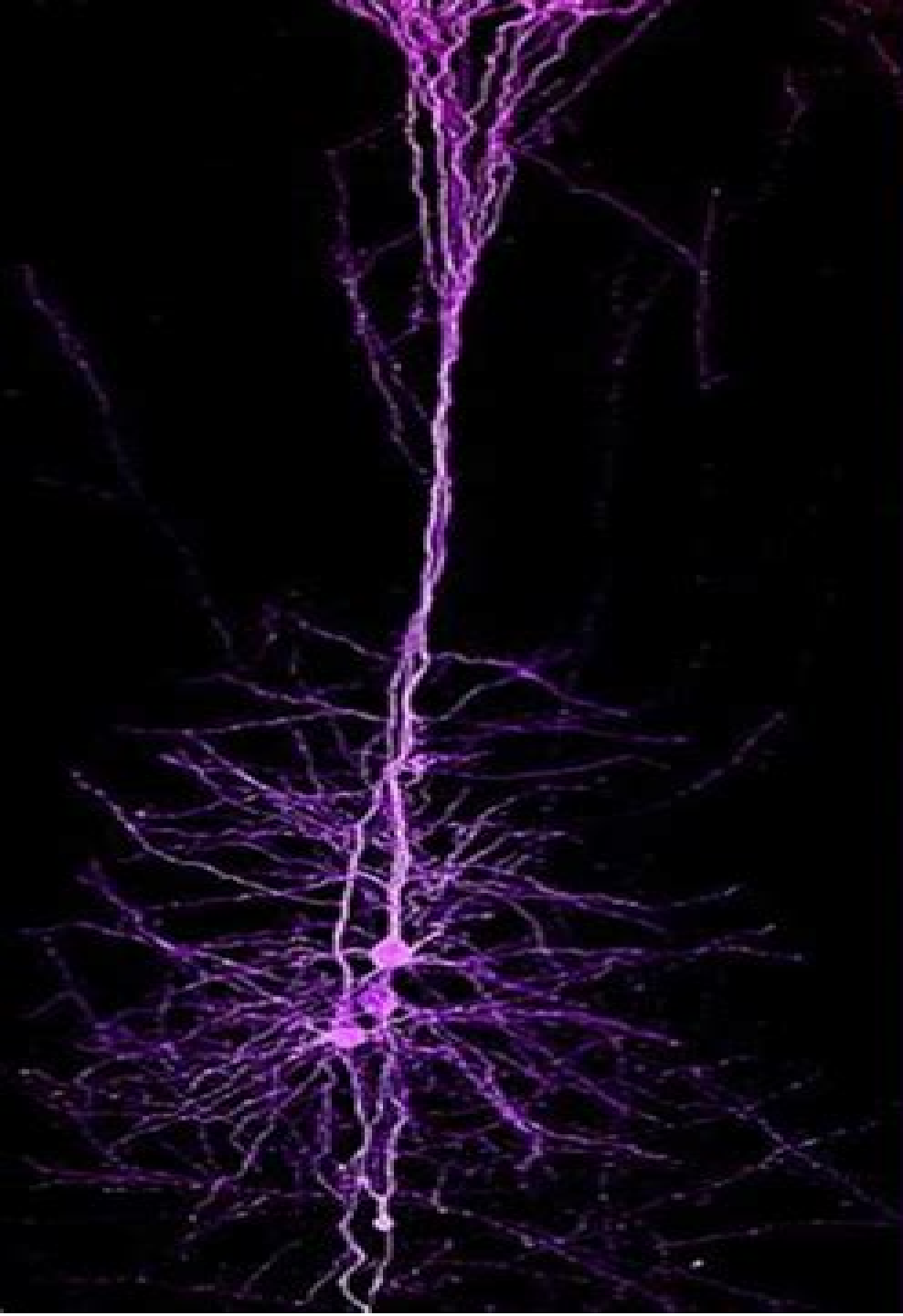




Methods in Neuronal Modeling

From Ions to Networks
second edition

edited by
Christof Koch
and **Idan Segev**

Methods In Neuronal Modeling From Ions To Networks

Christof Koch, Idan Segev



Methods In Neuronal Modeling From Ions To Networks:

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serves as a reference book for graduate students research scholars and teachers Selected sections or a compendium of chapters may be used as reference book for a one or two semester graduate course in Biomedical Engineering Some academicians will construct a textbook out of selected sections or chapters The Handbook is also meant as a state of the art volume for researchers Due to its comprehensive coverage researchers in one field covered by a certain section of the Handbook would find other sections valuable sources of cross reference for information and fertilization of interdisciplinary ideas Industry researchers as well as clinicians using neurotechnologies will find the Handbook a single source for foundation and state of the art applications in the field of Neuroengineering Regulatory agencies entrepreneurs investors and legal experts can use the Handbook as a reference for their professional work as well

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Singular Stochastic Differential Equations Alexander S. Cherny, Springer Science+Business Media, 2005

Neural Control Engineering Steven J. Schiff, 2022-11-01 How powerful new methods in nonlinear control engineering can be applied to neuroscience from fundamental model formulation to advanced medical applications Over the past sixty years powerful methods of model based control engineering have been responsible for such dramatic advances in engineering systems as autoland aircraft autonomous vehicles and even weather forecasting Over those same decades our models of the nervous system have evolved from single cell membranes to neuronal networks to large scale models of the human brain Yet until recently control theory was completely inapplicable to the types of nonlinear models being developed in neuroscience The revolution in nonlinear control engineering in the late 1990s has made the intersection of control theory and neuroscience possible In Neural Control Engineering Steven Schiff seeks to bridge the two fields examining the application of new methods in nonlinear control engineering to neuroscience After presenting extensive material on formulating computational neuroscience models in a control environment including some fundamentals of the algorithms helpful in crossing the divide from intuition to effective application Schiff examines a range of applications including brain machine interfaces and neural stimulation He reports on research that he and his colleagues have undertaken showing that nonlinear control theory methods can be applied to models of single cells small neuronal networks and large scale networks in disease states of

Parkinson's disease and epilepsy With Neural Control Engineering the reader acquires a working knowledge of the fundamentals of control theory and computational neuroscience sufficient not only to understand the literature in this transdisciplinary area but also to begin working to advance the field The book will serve as an essential guide for scientists in either biology or engineering and for physicians who wish to gain expertise in these areas

Principles of Computational Modelling in Neuroscience David Sterratt, Bruce Graham, Andrew Gillies, Gaute Einevoll, David Willshaw, 2023-10-05 Taking a step by step approach to modelling neurons and neural circuitry this textbook teaches students how to use computational techniques to understand the nervous system at all levels using case studies throughout to illustrate fundamental principles Starting with a simple model of a neuron the authors gradually introduce neuronal morphology synapses ion channels and intracellular signalling This fully updated new edition contains additional examples and case studies on specific modelling techniques suggestions on different ways to use this book and new chapters covering plasticity modelling extracellular influences on brain circuits modelling experimental measurement processes and choosing appropriate model structures and their parameters The online resources offer exercises and simulation code that recreate many of the book's figures allowing students to practice as they learn Requiring an elementary background in neuroscience and high school mathematics this is an ideal resource for a course on computational neuroscience

Complex Networks & Their Applications XIII Hocine Cherifi, Murat Donduran, Luis M. Rocha, Chantal Cherifi, Onur Varol, 2025-04-02 This book highlights cutting edge research in network science offering scientists researchers students and practitioners a unique update on the latest advances in theory and a multitude of applications It presents the peer reviewed proceedings of the XIII International Conference on Complex Networks and their Applications COMPLEX NETWORKS 2024 The carefully selected papers cover a wide range of theoretical topics such as network embedding and network geometry community structure network dynamics diffusion epidemics and spreading processes machine learning and graph neural networks as well as all the main network applications including social and political networks networks in finance and economics biological networks and technological networks

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 - Chapter 4: Methods In Neuronal Modeling From Ions To Networks in Specific Contexts
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