

MODELING IN THE NEUROSCIENCES

From Biological Systems to Neuromimetic Robotics

Second Edition

"The more we learn about the brain, the more we are convinced that understanding its incomputability will be a key to unlocking its functions. Neuroscience is turning a corner, and this book is helping to usher in a new era. The Second Edition is essential reading for those interested in contemporary approaches to neural modeling."

—Paul Bach-y-Rita, M.D., Professor of Rehabilitation Medicine and Biomedical Engineering, University of Wisconsin, USA

"The brain is an integrative organ of adjustment from gene networks to neuronal networks. The vast complexity involved requires mathematical modeling. The Second Edition advances such an integrative approach, and is undoubtedly a mathematical tour de force. This book will radically change our perception of theoretical and computational neuroscience."

—Roman M. Borisyuk, D.Sc., Professor of Computational Neuroscience, Centre for Theoretical and Computational Neuroscience, University of Plymouth, UK

"Physiologically realistic and integrative models of the brain are the only way forward to lift us clear of the jungle of detail about the brain. The essence of brain function dynamics that they embody will serve as the fundamental fulcrum around which new details (parameters) can be added and tested across scale. This book exemplifies a realistic way forward for an explicit 'integrative neuroscience.'"

—Evian Gordon, Ph.D., CEO, The Brain Resource Company, and Scientific Chair (and founding director), The Brain Dynamics Centre, Westmead Hospital, Sydney, Australia

With contributions from more than 40 renowned experts, **Modeling in the Neurosciences, Second Edition** is essential for those interested in constructing more structured and integrative models with greater biological insight. Focusing on new mathematical and computer models, techniques, and methods, this book represents a cohesive and comprehensive treatment of various aspects of the neurosciences from the molecular to the network level. Many state-of-the-art examples illustrate how mathematical and computer modeling can contribute to the understanding of mechanisms and systems in the neurosciences. Each chapter also includes suggestions of possible refinements for future modeling in this rapidly changing and expanding field.



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