



Mathematical Foundations of Neuroscience

By G. Bard Ermentrout

Springer-Verlag New York Inc. Paperback. Book Condition: New. Paperback. 422 pages. Dimensions: 9.1in. x 6.1in. x 0.8in. One can say that the field of computational neuroscience started with the 1952 paper of Hodgkin and Huxley in which they describe, through nonlinear partial differential equations, the genesis of the action potential in the giant axon of the squid. These equations and the methods that arose from this combination of modeling and experiments have since formed the basis for nearly every subsequent model for active cells.

The Hodgkin-Huxley model and a host of simplified equations that are derived from it have inspired the development of new and beautiful mathematics. Dynamical systems and computational methods are now being used to study activity patterns in a variety of neuronal systems. It is becoming increasingly recognized, by both experimentalists and theoreticians, that issues raised in neuroscience and the mathematical analysis of neuronal models provide unique interdisciplinary collaborative research and educational opportunities. This book is motivated by a perceived need for an overview of how dynamical systems and computational analysis have been used in understanding the types of models that come out of neuroscience. Our hope is that this will help to stimulate an increasing number of collaborations between mathematicians and other theoreticians, looking for interesting and relevant problems in applied mathematics and dynamical systems, and neuroscientists, looking for new ways to think about the biological mechanisms underlying...

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