

Bioelectricity: A Quantitative Approach

Robert Plonsey and Roger Barr

The study of electrophysiology has progressed rapidly because of the precise, delicate, and ingenious experimental studies of many investigators. The field has also made great strides by unifying these experimental observations through mathematical descriptions based on electromagnetic field theory, electrochemistry, etc., which underlies these experiments. In turn, these quantitative materials provide an understanding of many electrophysiological applications through a relatively small number of fundamental ideas.

Bioelectricity: A Quantitative Approach, is the new edition of the classic introductory text to electrophysiology. It covers many topics that are central the field including:

- electrical properties of the cell membrane
- action potentials
- cable theory
- extracellular waveforms
- cardiac electrophysiology
- function stimulation (FES)

Organized as a textbook for the student needing to acquire the core competencies, *Bioelectricity: A Quantitative Approach* will meet the demands of advanced undergraduate or graduate coursework in biomedical engineering and biophysics.

Key Features:

- New detailed illustrations
- Example problems
- A testing and solutions manual (CD-ROM) enclosed
- Useful appendixes and study guides

Praise for Previous Editions:

"This fine text, by two well-known bioengineering professors at Duke University, is an introduction to electrophysiology aimed at engineering students. Most of its chapters cover basic topics in electrophysiology: the electrical properties of the cell membrane, action potentials, cable theory, the neuromuscular junction, extracellular fields, and cardiac electrophysiology. The authors discuss many topics that are central to biophysics and bioengineering [and] the quantitative methods [they] teach will surely be productive in the future."

IEEE Engineering in Medicine and Biology

"The authors' goal in producing this book was to provide an introductory text to electrophysiology, based on a quantitative approach. In attempting to achieve this goal, therefore, the authors have opened the book with a useful, and digestible, introduction to various aspects of the mathematics relevant to this field, including vectors, introduction to Laplace, Gauss's theorem, and Green's theorem. This book will be useful for students in medical physics and biomedical engineering wishing to enter the field of electrophysiological investigation. It will also be helpful for biologists and physiologists who wish to understand the mathematical treatment of the processes and signals at the center of the interesting interdisciplinary field."

Medical and Biomedical Engineering and Computing

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