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Altri autori (Persone)	DunnStanley Martin ConstantinidesA MoghePrabhas V
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Nota di contenuto	Front cover; Title page; Copyright page; Table of contents; Preface; Organization and Outline of the Book; Part I: Fundamentals; Chapter 1 Modeling Biosystems; 1.1 Biomedical Engineering; 1.2 Fundamental Aspects of Biomedical Engineering; 1.3 Constructing Engineering Models; 1.3.1 A framework for problem solving; 1.3.2 Formulating the mathematical expression of conservation; 1.3.3 Using balance equations; 1.4 Examples of Solving Biomedical Engineering Models by Computer; 1.4.1 Modeling rtPCR efficiency; 1.4.2 Modeling transcranial magnetic stimulation; 1.4.3 Modeling cardiac electrophysiology 1.4.4 Using numerical methods to model the response of the cardiovascular system to gravity1.5 Overview of the Text; 1.5.1 Part I: Fundamentals; 1.5.2 Part II: Steady-state behavior (algebraic models); 1.5.3 Part III: Dynamic behavior (differential equations); 1.5.4 Part IV: Modeling tools and applications; 1.6 Lessons Learned in this Chapter; 1.7 Problems; 1.8 References; Chapter 2 Introduction to Computing; 2.1 Introduction; 2.2 The Role of Computers in Biomedical Engineering; 2.3 Programming Language Tools and Techniques; 2.3.1 Sequences of statements; 2.3.2 Conditional execution

2.3.3 Iteration2.3.4 Encapsulation; 2.4 Fundamentals of Data Structures for MATLAB; 2.4.1 Number representation; 2.4.2 Arrays; 2.4.3 Characters and strings; 2.4.4 Logical or Boolean data types; 2.4.5 Cells and cell arrays; 2.4.6 Data structures not explicitly found in MATLAB; 2.4.7 Data type conversion; 2.5 An Introduction to Object-Oriented Systems; 2.6 Analyzing Algorithms and Programs; 2.6.1 Polynomial complexity; 2.6.2 Operation counting; 2.7 Lessons Learned in this Chapter; 2.8 Problems; Chapter 3 Concepts of Numerical Analysis; 3.1 Scientific Computing
3.2 Numerical Algorithms and Errors3.3 Taylor Series; 3.4 Keeping Errors Small; 3.5 Floating-Point Representation in MATLAB; 3.5.1 The IEEE 754 standard for floating-point representation; 3.5.2 Floating-point arithmetic, truncation, and rounding; 3.5.3 Roundoff error accumulation and cancellation error; 3.6 Lessons Learned in this Chapter; 3.7 Problems; 3.8 References; Part II: Steady-State Behavior; Chapter 4 Linear Models of Biological Systems; 4.1 Introduction; 4.2 Examples of Linear Biological Systems; 4.2.1 Force balance in biomechanics; 4.2.2 Biomedical imaging and image processing
5.3 Examples of Nonlinear Equations in Biomedical Engineering

Sommario/riassunto

Numerical Modeling in Biomedical Engineering brings together the integrative set of computational problem solving tools important to biomedical engineers. Through the use of comprehensive homework exercises, relevant examples and extensive case studies, this book integrates principles and techniques of numerical analysis. Covering biomechanical phenomena and physiologic, cell and molecular systems, this is an essential tool for students and all those studying biomedical transport, biomedical thermodynamics & kinetics and biomechanics.· Supported by Whitaker Foundation Teaching