图书基本信息

- 书名:<<物理学和工程学中的计算方法>>
- 13位ISBN编号:9787506247207
- 10位ISBN编号:7506247208
- 出版时间:2000-6
- 出版时间:世界图书出版公司
- 作者:S.S.M.Wong
- 页数:508
- 版权说明:本站所提供下载的PDF图书仅提供预览和简介,请支持正版图书。

更多资源请访问:http://www.tushu007.com

内容概要

Computational methods form an increasingly important part of the undergraduate curricu-lum in physics and engineering these days. This book is mainly concerned with the ways that computers may be used to advance a student's understanding of physics. A large part of the material is common to engineering as well. The subject matter covered in this volume may be classified also under the title of "computational physics." There are several ways to organize the material that should be included. The choice made here is to follow the traditional approach of mathematical physics. That is, the chapters and sections are grouped around methods, with physical problems used as the motivation and examples. One attractive alternative is to group around physical phenomena. The difficulty of following this way of organization is the heavy reliance on the physics background of the readers, thus making it harder to follow for students at early stages of their education. For this reason, such an approach is rejected.

书籍目录

Preface to the FirstEditionPreface to the Second Edition1 Computational Methods 1-1 Numerical calculations and beyond 1-2 Integers and floating numbers 1-3 Programming language and program library 1-4 Examples of algebraic, integer and floating numbercalculations 1-5 Examples of unconventional techniques Problems2 Integration and Differentiation 2-1 Numerical integration 2-2 Rectangular and trapezoidal rules 2-3 Simpson''s rule 2-4 Gaussian guadrature 2-5 Monte Carlo integration 2-6 Multidimensional integrals and improper integrals 2-7 Numerical differentiation Problems3 Interpolation and Extrapolation 3-1 Polynomial interpolation 3-2 Interpolation using rational functions 3-3 Continued fraction 3-4 Fourier transform 3-5 Extrapolation 3-6 Inverse interpolation 3-7 Cubic spline Problems4 Special Functions 4-1 Hermite polynomials and harmonic oscillator 4-2 Legendre polynomials and spherical harmonics 4-3 Spherical Bessel functions 4-4 Laguerre polynomials 4-5 Error integrals and gamma functions Problems5 Matrices 5-1 System of linear equations 5-2 Matrix inversion and LU-decomposition 5-3 Matrix approach to the eigenvalue problem 5-4 Tridiagonalization method 5-5 Eigenvalues and eigenvectors of a tridiagonal matrix 5-6 Lanczos method of constructing matrices 5-7 Nonsymmetric matrices and complex matrices Problems6 Methods of Least Squares 6-1 Statistical description of data 6-2 Uncertainties and their propagation 6-3 The method of maximum likelihood 6-4 The method of least squares 6-5 Statistical tests of the results 6-6 Linear least-squares fit 6-7 Nonlinear least-squares fit to data Problems7 Monte Carlo Calculations 7-1 Generation of random numbers 7-2 Molecular diffusion and Brownian motion 7-3 Data simulation and hypothesis testing 7-4 Percolation and critical phenomena 7-5 The Ising model 7-6 Path integrals in guantum mechanics 7-7 Fractals Problems8 Finite Difference Solution of Differential Equations 8-1 Types of differential equations 8-2 Runge-Kutta methods 8-3 Solution of initial value problems by extrapolation 8-4 Boundary value problems by shooting methods 8-5 Relaxation methods 8-6 Boundary value problems in partial differential equations 8-7 Parabolic partial differential equations 8-8 Hyperbolic partial differential equations 8-9 Nonlinear differential equations 8-10 Stiffness problems Problems9 Finite Element Solution to PDE 9-1 Background 9-2 Shape functions and finite element approximation 9-3 Assembling contributions from elements 9-4 Variational approach 9-5 Application to a two-dimensional Poisson equation ProblemsAppendix A A-1 Decomposition into prime numbers A-2 Bit-reversed order A-3 Gaussian elimination of a tridiagonal matrix A-4 Random bit generator A-5 Reduction of higher-order ODE to first-orderAppendix B List of Fortran Program ExamplesBibliographyIndex

版权说明

本站所提供下载的PDF图书仅提供预览和简介,请支持正版图书。

更多资源请访问:http://www.tushu007.com