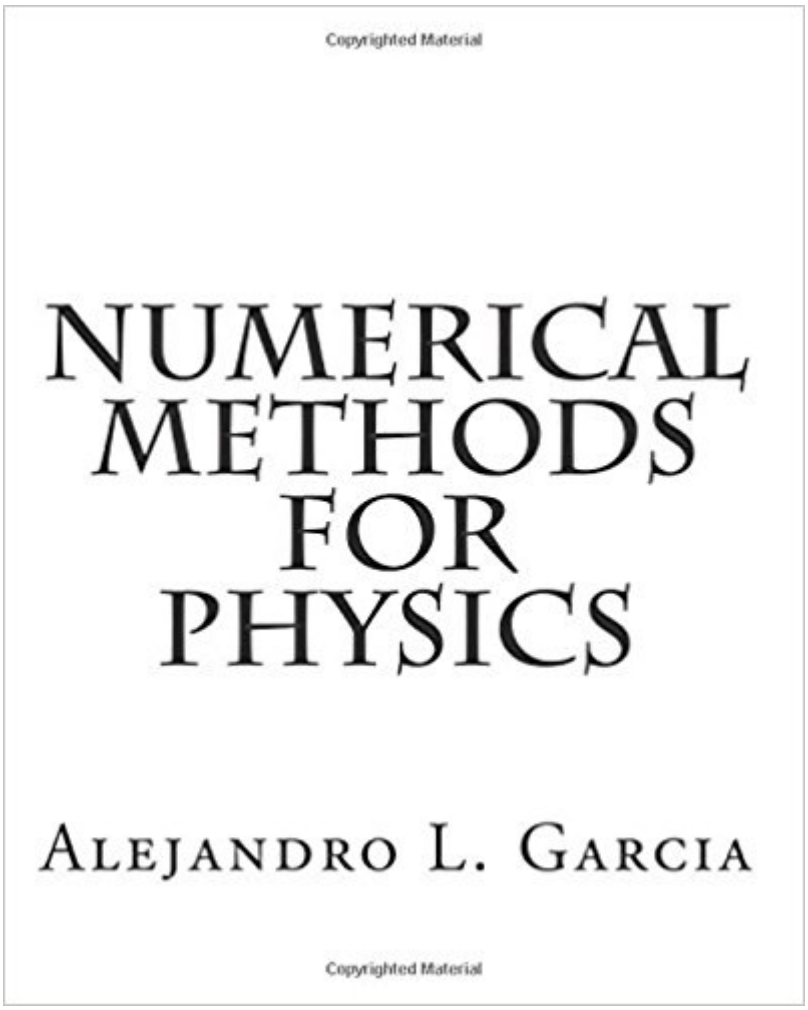
Numerical Methods For Physics



Synopsis

This book covers a broad spectrum of the most important, basic numerical and analytical techniques used in physics â ”including ordinary and partial differential equations, linear algebra, Fourier transforms, integration and probability. Now language-independent. Features attractive new 3-D graphics. Offers new and significantly revised exercises. Replaces FORTRAN listings with C++, with updated versions of the FORTRAN programs now available on-line. Devotes a third of the book to partial differential equationsâ ”e.g., Maxwell’s equations, the diffusion equation, the wave equation, etc. This numerical analysis book is designed for the programmer with a physics background. Previously published by Prentice Hall / Addison-Wesley

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Customer Reviews

This text covers a broad spectrum of the most important, basic numerical and analytical techniques used in physics -- including ordinary and partial differential equations, linear algebra, Fourier transforms, integration and probability. Based on MATLAB, Fortran references included. --This text refers to an out of print or unavailable edition of this title.

Garcia, Alejandro, Numerical Methods for Physics, Second Edition This book covers a broad spectrum of the most important, basic numerical and analytical techniques used in physics —including ordinary and partial differential equations, linear algebra, Fourier transforms, integration and probability. Now language-independent. Features attractive new 3-D graphics. Offers new and significantly revised exercises. Replaces FORTRAN listings with C++, with updated

versions of the FORTRAN programs now available on-line. Devotes a third of the book to partial differential equations—e.g., Maxwell’s equations, the diffusion equation, the wave equation, etc. This numerical analysis book is designed for the programmer with a physics background. --This text refers to an out of print or unavailable edition of this title.

Don’t spend your money on the more expensive and older text! The author published this update and it’s perfect and much less expensive. Highly recommend!

useful

Excellent text. I would have given it five stars if the book include modern Fortran programs, which remains the only really good programming language for advanced numerical and computational analyses.

The book is excellent so far in my course and the downloadable code is well written and documented.To download the code for this book, Google "Garcia computational physics". Then go to the authors personal site.This link to the code should have been included in the preface, but was given in my class.

This book is an outstanding introduction to practical numerical methods for (budding) physicists who have no experience with these vital tools. The author states the book is aimed at undergraduate seniors or first-year graduates. This seems pessimistic to me: I think any competent undergraduate who has taken a course in ordinary differential equations could hack it.The book ignores the usual approach taken by numerical analysis texts, which is to build up from the fundamental ideas (e.g., finite precision arithmetic, error propagation, fixed point iteration, finite difference approximation to the derivative), instead jumping almost immediately into a projectile motion ODE problem. This allows the author to move on quickly to adaptive Runge-Kutta in Chapter 3, Fast Fourier Transforms in Chapter 5, PDEs in Chapter 6 and finish with a discussion of Monte Carlo methods; whereas more traditional books will only begin to cover PDEs near the end and usually do not discuss FFTs or Monte Carlo.Of course, this comes at a price. I took a senior level course taught in the traditional manner described above, and happened to pick up a copy of this book in the middle of the semester. This book has far more physical insight than my assigned text, and leaves the student able to appoach a far greater set of practical problems, but I think those who are serious about

computational work should cover the basics more thoroughly. One outstanding feature of the book is the end of chapter projects that unify and apply what has been learned, and offer a chance for better students to stretch their muscles.On the other side, what the author says in the preface bears repeating here: the methods in described in this book are (almost all) foundational, and nowhere near the state of the art. This is particularly true of the relaxational methods for PDEs described in Chapter 8. Nor do I think this would make a very useful reference book: anyone experienced enough to be able to read and understand (say) Numerical Recipes will not learn much from this book. Also, for a modestly-sized paperback with only black-and-white printing, it is amazingly expensive.

I cannot recommend this book highly enough for physics or engineering students undertaking a first course in numerical methods. The presentation is clear, comprehensive and illustrated with copious examples. The material covered includes most of that a theoretical/computational physicist should be familiar with. The mathematics required is not particularly taxing. If you've got a good understanding of ODEs and a basic understanding of PDEs, then this book should be accessible.However, it should be noted who this book is NOT for. This book is not for those seeking a deeper understanding of numerical methods. For that, you're much better off reaching for a mathematics text (such as Shampine/Gordon). This book is also not for practicing scientists or engineers who require more advanced or computationally efficient methods. This book is meant as an introduction, and the author sticks to that rigorously. That said, after mastering the material in this book, there should be nothing preventing you from moving on to more advanced methods and difficult problems.If you are looking for an introductory text though, you'd be hard pressed to top this one.

I have attended Professor Garcia's first year grad class in computational physics and it was very good. Professor Garcia is a very clear lecturer and I think this comes through in his book. The book breaks down the problem of numerical methods to very simple bite size chunks and provides a very interesting way to learn numerical methods by immediately applying it to interesting real world problems. this book allows you to feel like you are learning and applying numerical methods almostimmediately. There are entire programs listed in the book and in an accompanying disk which can be used in the solution of the problems. One simply edits and adds to these programs to solve most of the problems. Afterwards you have a good collection of generic code which can be put together to solve other problems. The book includes the code in C++ and Matlab. (older edition had

fortran and matlab) Professor Garcia is a person who works in the area of computational fluid dynamics and statistical mechanics, both very computational areas, hence he is well qualified to write this text. There are a good number of problems and answers to a number of these, so the book is also useful for self study. Try it you'll like it.

I got this book because I wanted a more modern reading on numerical techniques. This book delivers this and more. Not only does it include psuedo code, but it also includes actual USEFUL code in matlab and in C++. The examples are all useful for doing either problems for the workplace, or as a textbook/supplement for a course on numerical analysis. The book also gives good physical and 'numerical' insight to the code and technique involved.If I had one numerical book to take with me, this would be it. I'm sure I would develop other techniques based on what I learned from this book.

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