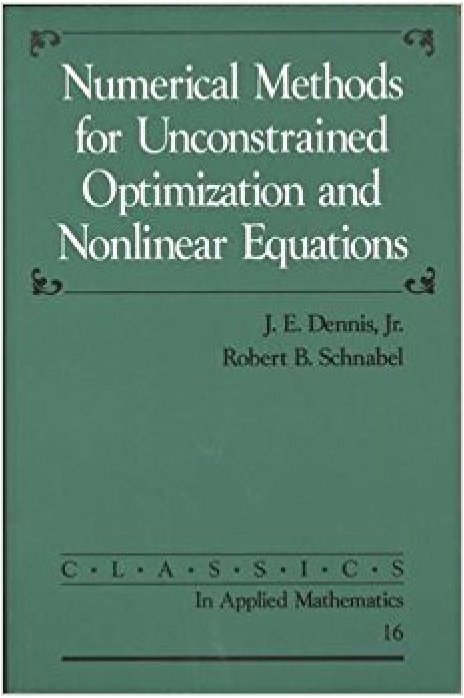
Numerical Methods For Unconstrained Optimization And Nonlinear Equations (Classics In Applied Mathematics)



Synopsis

This book has become the standard for a complete, state-of-the-art description of the methods for unconstrained optimization and systems of nonlinear equations. Originally published in 1983, it provides information needed to understand both the theory and the practice of these methods and provides pseudocode for the problems. The algorithms covered are all based on Newton's method or 'quasi-Newton' methods, and the heart of the book is the material on computational methods for multidimensional unconstrained optimization and nonlinear equation problems. The republication of this book by SIAM is driven by a continuing demand for specific and sound advice on how to solve real problems.

Book Information

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Customer Reviews

"...This is an excellent book to be used as a text or a resource." -- T. F. Coleman, Zentrallblatt fÃƒÂ r Mathematik, Band 847/96.

J. E. Dennis, Jr. is Noah Harding Professor of Computational and Applied Mathematics at Rice University. Robert B. Schnabel is Professor of Computer Science at the University of Colorado at Boulder.

THE reference when it comes to practical implementation of Newton-type nonlinear unconstrained convex optimization algorithms. It contains a good discussion on the relevant proofs, but it doesn't belabor the points. It’s main purpose is practical implementation, and it does it well. If you’re looking for a book with more in-depth conceptual discussion, see Nocedal and Wright. But if you are looking to write your own code, look no further. It also lacks coverage, in a sense that only one line search method is presented, and one set of conditions (Armijo and Goldstein). I believe there’s also no discussion of inexact Newton methods, among other things. However, if you read the remainder of my review, this is not an issue. This book will help you write code that is modular. Simply pick a method you are partial to, and implement it as a module within the given framework. Job complete.It has the perfect breakdown for implementation: discussions of basic Newton strategy, adds complexity by introducing the concept of global convergence and covers two widely used approaches: line searches and trust regions. It then has a chapter dedicated to practical implementation details, such as stopping criteria and scaling - often an afterthought in other more theoretical texts.The crown jewel of it all though is the appendix, which contains "code" for implementing the algorithms. It has a nice modular design, all written in very clear pseudocode. The way it’s organized does have you flipping back and forth between sections frequently, but I don’t think there are too many alternatives in a print book. Each "driver" or "algorithm" also has a nice discussion associated with it.My only comments would be that some software design choices, and talk, like that of ’storage considerations’ are outdated. But this is not a problem for any seasoned programmer - the framework presented can easily be modernized.One of my favorite books without a doubt.

Looking for a text that explains the maths and the implementation of optimisation? I needed to write a program that included numerical optimisation, but I didn’t understand the maths. I’d tried to read some other books on the subject, but I gave up because they presumed too much background knowledge and because they were written in an academic format (all proofs, greek letters and algebra) too obscure for me to wade through.This book explains everything in plain english. When there is a new concept to be introduced, they begin with a practical example of the problem and then step through the solution. Any proofs are accompanied by graphs and words. The emphasis is on practicality and concepts rather than algebraic rigour.I recommend this book to anyone who needs to create their own optimisations, or who wants to understand what goes on inside their software.

Good book. Informative

I found this book a bit disappointing. The content is serious and the methods described are well proven. The pure math part is sound. However this book is not well balanced. Too much space is allocated to the one variable root finding and one variable optimization: almost half of the book. One variable problems are the basis, but, too much is too much.among the different methods there is not much comparisons with the pros and cons. If I was to compare I would say that the text part of "numerical recipes" is more didactic, and although mathematical demonstrations of convergence are not given, is better.I have the feeling that the author hesiates between the just-graduated public and higher level.

The ultimate self-teaching book for Newton-type algorithms that address small or large systems of nonlinear equations. A comprehensive treatment of general unconstrained optimization, least-squares optimization, and also well-determined systems. Unusually well-written, with a nice blend between underlying theory and practical implementation requirements. Complete pseudo-code within the appendix enables one to create their own program in any language. Alternatively, Fortran source code created by the authors (UNCMIN) can be obtained from Netlib on the web. SIAM calls this book a "Classic" for good reason.

I have to linearise a mathematical model for a Computational Fluid Dynamics problem. I have many books on CFD which all mention Newtons Method for linearisation, however I have struggled with their description of Newtons Method. Fortunately the book by Dennis and Schnabel is first class and I would highly recomend this book for anyone working on CFD problems. Newtons Method now seems straight forward, thanks to this book.

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