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Título: Solving Nonlinear Equations With Newton's Method

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Sinopsis

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Fundamentals of Algorithms 1

This brief book on Newton's method is a user-oriented guide to algorithms and implementation. In just over 100 pages, it shows, via algorithms in pseudocode, in MATLAB, and with several examples, how one can choose an appropriate Newton-type method for a given problem, diagnose problems, and write an efficient solver or apply one written by others. Solving Nonlinear Equations with Newton's Method contains trouble-shooting guides to the major algorithms, their most common failure modes, and the likely causes of failure. It also includes many worked-out examples (available on the SIAM website) in pseudocode and a collection of MATLAB codes, allowing readers to experiment with the algorithms easily and implement them in other languages.

This book is intended to complement Kelley's larger book, *Iterative Methods for Linear and Nonlinear Equations* (SIAM, 1995), which focuses on in-depth treatment of convergence theory, but does not discuss the details of solving particular problems, implementation in any particular language, or evaluating a solver for a given problem.

Audience

Computational mathematicians will find this book useful in mastering the state of the art and moving it forward. Any engineer or scientist taking part in a computational project or involved in any computational science and engineering academic program will benefit from this book. The reader is assumed to have a good understanding of elementary numerical analysis and of numerical linear algebra. Because the examples are so closely coupled to the text, this book cannot be understood without a working knowledge of MATLAB.

How to Get the Software

This book is tightly coupled to a suite of MATLAB code. The codes are available from SIAM at the URL: <http://www.siam.org/books/fa01/>

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Preface; How to Get the Software; Chapter 1: Introduction; Chapter 2: Finding the Newton Step with Gaussian Elimination; Chapter 3: Newton-Krylov Methods; Chapter 4: Broyden's Method; Bibliography; Index.