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REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the American Mathematical Society classification scheme. The 1991 Mathematics Subject Classification can be found in the annual subject index of *Mathematical Reviews* starting with the December 1990 issue.

9[65-02, 90-02, 65K10, 49M37, 90C06]—*Iterative methods for optimization*, by C. T. Kelly, Frontiers in Applied Mathematics, Volume 18, SIAM, Philadelphia, PA, 1999, xiv+180 pp., $25\frac{1}{2}$ cm, softcover, $37.00

Accurate modeling of scientific problems often leads to the formulation of large optimization problems. In recent years optimization has seen a dramatic increase in activity. This is a natural consequence of new algorithmic developments, new application domains, and the increased power of computers.

The book under review deals with the study of iterative methods for unconstrained and constrained optimization problems with bounds on the variables. Emphasis is given to the algorithmic description of methods. Each algorithm is described in pseudocode, and a collection of MATLAB codes is available. In addition to traditional gradient-based optimization, it covers sampling methods, including the Hooke-Jeeves, implicit filtering, MDS, and Nelder-Mead schemes.

After the Preface and information on "How to Get the Software", the book is divided into two parts. The first part deals with optimization of smooth functions. It contains five chapters: Basic Concepts, Local Convergence of Newton's Method, Global Convergence, The BFGS Method, and Simple Bound Constraints. The second part of the book deals with optimization of noisy functions and contains three chapters: Basic Concepts and Goals, Implicit Filtering, and Direct Search Algorithms. The book ends with a large bibliography and a very useful index. There are several important omissions in the bibliography. For example, on page 120 the references for the Lennard-Jones problem are not the most informative pointers for someone who is not familiar with the subject (see P. M. Pardalos, D. Shalloway and G. Xue (Editors), *Global minimization of nonconvex energy functions: Molecular conformation and protein folding*, DIMACS Series Vol. 23, American Mathematical Society (1996)). There are also some typos (including the name of the reviewer).

Overall, the book presents iterative methods for optimization in a rigorous and clear manner, and illustrates very successfully recent mathematical approaches and results with various examples from applications. Moreover, it unifies ideas for sampling methods and traditional gradient methods. I would recommend this book to anyone who is interested in solving optimization problems.

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