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Optimization algorithms on matrix manifolds. (English) Zbl 1147.65043

Princeton, NJ: Princeton University Press (ISBN 978-0-691-13298-3/hbk). xv, 224 p. (2008).

This book has 224 pages and it is divided into an Introduction and seven chapters, namely: Chapter 2: Motivation and applications (p. 5); Chapter 3: Matrix manifolds: First-order geometry (p. 17); Chapter 4: Line search algorithms on manifolds (p. 54); Chapter 5: Matrix manifolds: Second-order geometry (p. 91); Chapter 6: Newton's method (p. 91); Chapter 7: Trust-region methods (p. 136); Chapter 8: A constellation of superlinear algorithms (p. 168–198).

Many problems in the science and engineering can be rephrased as optimization problems on a matrix search space endowed with a so-called manifold structure. This book shows how to exploit the special structure of such problems to develop efficient numerical algorithms and to give differential geometric interpretations. Chapters 3, 4 and 5 offer differential geometry notions necessary to the algorithmic developments. The book presents applicative domains to mathematicians, engineers and computer scientists.

Reviewer: [Stefan Mititelu \(București\)](#)

MSC:

- [65K05](#) Numerical mathematical programming methods
- [65-02](#) Research exposition (monographs, survey articles) pertaining to numerical analysis
- [90-02](#) Research exposition (monographs, survey articles) pertaining to operations research and mathematical programming
- [90C51](#) Interior-point methods
- [90C53](#) Methods of quasi-Newton type
- [90C30](#) Nonlinear programming

Cited in **1** Review
Cited in **348** Documents

Keywords:

[mathematical programming](#); [textbook](#)