

# Titles in Applied Math from **SIAM**<sup>®</sup>

[www.siam.org/catalog](http://www.siam.org/catalog)



## Computational Optimization of Systems Governed by Partial Differential Equations

Alfio Borzi and Volker Schulz

Computational Science and Engineering 8

This book fills a gap between theory-oriented investigations in PDE-constrained optimization and the practical demands made by numerical solutions of PDE

optimization problems. The authors discuss computational techniques representing recent developments that result from a combination of modern techniques for the numerical solution of PDEs and for sophisticated optimization schemes. The book provides a bridge between continuous optimization and PDE modeling and focuses on the numerical solution of the corresponding problems.

2012 • xx + 282 pages • Softcover • ISBN 978-1-611972-04-7

List Price \$89.00 • SIAM Member Price \$62.50 • CS08

## Numerical Solution of Algebraic Riccati Equations

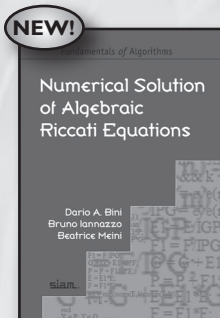
Dario A. Bini, Bruno Iannazzo, and Beatrice Meini

Fundamentals of Algorithms 9

This concise and comprehensive treatment of the basic theory of algebraic Riccati equations describes the classical as well as the more advanced algorithms for their solution in a manner that is accessible to both practitioners and scholars. It is the first book in which nonsymmetric algebraic Riccati equations are treated in a clear and systematic way. It includes a discussion of doubling algorithms and a detailed description of all classical and advanced algorithms for solving algebraic Riccati equations, along with their MATLAB<sup>®</sup> codes.

2012 • xvi + 250 pages • Softcover • ISBN 978-1-611972-08-5

List Price \$69.00 • SIAM Member Price \$48.30 • FA09



## A First Course in Numerical Methods

Uri M. Ascher and Chen Greif

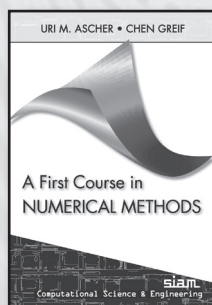
Computational Science and Engineering 8

This new textbook is designed for students and researchers who seek practical knowledge of modern techniques in scientific computing. Avoiding encyclopedic and heavily theoretical exposition, the book provides an in-depth treatment of fundamental issues and methods, the reasons behind the success and failure of numerical software, and fresh and easy-to-follow approaches and techniques.

The authors focus on current methods, issues, and software while providing a comprehensive theoretical foundation.

2011 • xxii + 552 pages • Softcover • 978-0-898719-97-0

List Price \$95.00 • SIAM Member Price \$66.50 • CS07



## The Art of Differentiating Computer Programs: An Introduction to Algorithmic Differentiation

Uwe Naumann

Software, Environments, and Tools 24

This is the first entry-level book on algorithmic (also known as automatic) differentiation (AD), providing fundamental rules for the generation of first- and higher-order tangent-linear and adjoint code. The author covers the mathematical underpinnings as well as how to apply these observations to real-world numerical simulation programs. Readers will find many examples and exercises, including hints to solutions. Also included are the prototype AD tools `adco` and `adcc` for use with the examples and exercises.

2012 • xviii + 340 pages • Softcover • ISBN 978-1-611972-06-1

List Price \$93.00 • SIAM Member Price \$65.10 • SE24

## Spectral Numerical Weather Prediction Models

Martin Ehrendorfer

This book provides a comprehensive overview of numerical weather prediction (NWP) focusing on the application of the spectral method in NWP models. The author illustrates the use of the spectral method in theory as well as in its application to building a full prototypical spectral NWP model, from the formulation of continuous model equations through development of their discretized forms to coded statements of the model. The book provides readers with theoretical and practical exercises, some of which include solutions.

2011 • xxvi + 498 pages • Softcover • ISBN 978-1-611971-98-9

List Price \$129.00 • SIAM Member Price \$90.30 • OT124

## Taylor Approximations for Stochastic Partial Differential Equations

Arnulf Jentzen and Peter E. Kloeden

CBMS-NSF Regional Conference Series in Applied Mathematics 83

This book presents a systematic theory of Taylor expansions of evolutionary-type stochastic partial differential equations (SPDEs). The authors show how Taylor expansions can be used to derive higher order numerical methods for SPDEs, with a focus on pathwise and strong convergence. Recent developments on numerical methods for random and stochastic ordinary differential equations are also included since these are relevant for solving spatially discretised SPDEs as well as of interest in their own right.

2011 • xiv + 220 pages • Softcover • ISBN 978-1-611972-00-9

List Price \$77.00 • SIAM/CBMS Member Price \$53.90 • CB83

**TO ORDER, SHOP ONLINE AT [www.siam.org/catalog](http://www.siam.org/catalog)**

**Use your credit card** (AMEX, MasterCard, and VISA) by phone: +1-800-447-SIAM (toll free in US) or +1-215-382-9800 (worldwide) or fax: +1-215-386-7999.

**Or send check or money order** in US dollars to: SIAM, Dept. BKIT12, 3600 Market Street, 6th Floor, Philadelphia, PA 19104-2688 USA.

**Members and customers outside North America can also order SIAM books through SIAM's distributor, Cambridge University Press, at [www.cambridge.org/siam](http://www.cambridge.org/siam).**

All prices are in US dollars.