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Book Reviews

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# BOOK REVIEWS

*J. H. Davis*: DIFFERENTIAL EQUATIONS WITH MAPLE. AN INTERACTIVE APPROACH. Birkhäuser-Verlag, Boston, 2001. ISBN 0-8176-4181-5, xiv + 409 pages, with 1 CD-ROM, price USD 59.95.

The present textbook is concerned with the use of the MAPLE package for solving problems connected with differential equations.

The following list of chapters describes the content of the book: 1. Introduction to Maple; 2. Introduction to differential equations; 3. First order equations; 4. Introduction to numerical methods; 5. Higher order differential equations; 6. Laplace transform methods; 7. Systems of equations; 8. Stability; 9. Periodic problems; 10. Impedances and differential equations; 11. Partial differential equations; 12. Introduction to Maple applications; 13. Plotting with Maple; 14. Maple and Laplace transforms; 15. Maple linear algebra applications; 16. Runge-Kutta designs; 17. Maple packages.

The first part of the text introduces Maple.

The second part of the text first covers conventional differential equation topics. That is, first-order equations, $n$th-order equations and systems, periodic solutions, stability, and an introduction to boundary value problems are included. Vector differential equations are also covered. The course in differential equations starts with fairly well explained examples from different fields of application. The theory is presented in a student-friendly, understandable form. It starts with a scalar first-order equation, its explicit solvability and the problem of the existence of a solution, and continues with systems of equations. Topics like Laplace transformation, Liapunov stability, periodic problems are touched, too. A short view to partial differential equations is given.

The problems presented at the end of each chapter contain material for using the theory or the tools presented in the frame of MAPLE. The enclosed CD-ROM provides the MAPLE-sources of the given examples.

The textbook is recommended for those who start solving differential equation problems by MAPLE and also for those who need an introduction in (mainly ordinary) differential equations.

*Štefan Schwabik*

*E. Giné, Ch. Houdré, and D. Nualart, eds.*: STOCHASTIC INEQUALITIES AND APPLICATIONS. Progress in Probability, Vol. 56. Birkhäuser-Verlag, Basel, 2003. ISBN 3-7643-2197-0, viii+365 pages, price EUR 148.–.

This volume grew out of a conference on *Stochastic Inequalities and their Applications* held in Barcelona in June 2002. Inequalities are ubiquitous in mathematics and so it comes as no surprise that the twenty papers contained in the book address a very wide spectrum of problems in probability theory, being tied together rather loosely.

The book is divided into four sections: I. Geometric inequalities (4 papers), II. Independent random vectors, chaos, martingales and Lévy processes (8 papers), III. Empirical processes (4 papers), and IV. Stochastic differential equations (4 papers). Roughly speaking, most of the articles testify the deep impact that concentration of measure inequalities have had on many parts of contemporary mathematics. However, the reader may find

also, for instance, a paper on existence and uniqueness of solutions to a stochastic differential equation driven by an additive fractional Brownian motion and with a drift satisfying only weak integrability conditions. Had the reviewer to single out one theorem from the many interesting results contained in the book, he would choose the following one due to S. Kwapień and V. Tarieladze: Let $(x_i)$ be a sequence in a Banach space and $(\gamma_i)$ a sequence of independent standard Gaussian variables, then the series $\sum_i \gamma_i x_i$ is almost surely unconditionally convergent if and only if it is almost surely convergent and $\sum_i x_i$ converges unconditionally.

All the papers were refereed and almost all are research papers with full proofs.

*Bohdan Maslowski*

*V. Capasso, D. Bakstein*: AN INTRODUCTION TO CONTINUOUS-TIME STOCHASTIC PROCESSES: THEORY, MODELS, AND APPLICATIONS TO FINANCE, BIOLOGY, AND MEDICINE. Birkhäuser-Verlag, Boston, 2005. ISBN 0-8176-3234-4, hardcover, 343 pages, price EUR 82.–.

The theory of stochastic processes is a part of mathematics which is definitely not an end in itself. Its main purpose is to serve as rigorous grounds for modeling of random phenomena in many specific fields such as free markets, interest rates, contingent claims, insurance risks in finance, population dynamics, epidemiology, neuroscience, et cetera.

The book under review leads the reader through a bit more than necessary mathematical theory of time continuous stochastic processes in order that he or she could grasp the fundamental concepts in relevant modern literature.

The style of the book is rather educational and tends to keep the stream of exposition by omitting technicalities or lengthy proofs. An advantage of such an approach is that the reader gets to interesting applications more comfortably and without distraction—of course, at the price of not acquiring the very mathematical insight in the tools that are used in the economics and biology models.

The book is divided into three parts. The first one surveys the abstract theory of stochastic processes and stochastic differential equations, each chapter being accompanied by a series of exercises. In the second part, various models arising from finance, insurance, biology, and medicine are rigorously backed by the results from the first part of the book. The last part contains appendices on measure and integral theory, metric spaces, differential operators and differential equations.

The book is written in a systematic and self-contained way where omitted details are compensated by references to a commonly accesible literature. The book is destined to students or professionals who want to get acquainted with the role of stochastic processes in modeling of random phenomena in economics, biology or medicine.

*Martin Ondreját*