

# Economie, recherche opérationnelle, jeux

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## *Mécanique quantique*

G. KALMBACH. — **Quantum measures and spaces.** — Mathematics and its applications, vol. 153. — Un vol. relié, 16,5×24,5, de xi, 343 p. — ISBN 0-7923-5288-2. — Prix: Dfl. 295.00. — Kluwer Academic Publishers, Dordrecht, 1998.

Noncommutative measure theory is the theme of the first part of the book. The relevant quantum structures are algebraically introduced. This is then used in the axiomatic, geometric model discussed in the second part of the book, where old and partly new groups and finite-dimensional  $\mathbf{R}$ ,  $\mathbf{C}$ ,  $\mathbf{H}$ -spaces or spheres are studied for particle-series, a bag and the four basic interactions of physics. The third part investigates infinite dimensional spaces, particularly Archimedean and non-Archimedean orthomodular spaces, which generalize classical Herbert spaces. The last part of the book contains short reviews on related topics which are useful to have at hand.

## *Economie, recherche opérationnelle, jeux*

Jean-Pierre CROUZEIX, Juan-Enrique MARTINEZ-LEGAZ, Michel VOLLE, (Editors). — **Generalized convexity, generalized monotonicity: recent results.** — Nonconvex optimization and its applications, vol. 27. — Un vol. relié, 17×25, de xv, 467 p. — ISBN 0-7923-5088-X. — Prix: Dfl. 385.00. — Kluwer Academic Publishers, Dordrecht, 1998.

The geometrical structure induced by convexity in mathematical programming induces a lot of nice properties: continuity and differentiability of the functions, separability and optimality conditions, duality, sensibility of the optimal solutions, etc. Several among the most interesting ones are preserved when convexity is relaxed in quasiconvexity or pseudoconvexity (a function is quasiconvex if its lower set levels are convex). This is still the case for variational inequality problems when the classical monotonicity assumption on the map is relaxed in quasimonotonicity or pseudomonotonicity. This volume contains 23 selected lectures presented at the last International Symposium on Generalized Convexity. It provides an up-to-date review of recent developments.

George B. DANTZIG. — **Linear programming and extensions.** — Princeton landmarks in mathematics and physics. — Un vol. broché, 15,5×23,5, de xvi, 627 p. — ISBN 0-691-05913-6. — Prix: US\$29.95. — Princeton University Press, Princeton, 1993.

In real-world problems related to finance, business, and management, mathematicians and economists frequently encounter optimization problems. In this classic book, the author looks at a wealth of examples and develops linear programming methods for their solutions. He begins by introducing the basic theory of linear inequalities and describes the powerful simplex method used to solve them. Treatments of the price concept, the transportation problem, and matrix methods are also given, and key mathematical concepts such as the properties of convex sets and linear vector spaces are covered.

Mark M. MEERSCHAERT. — **Mathematical modeling.** — Second edition. — Un vol. relié, 16,5×23,5, de xvi, 351 p. — ISBN 0-12-487652-8. — Prix: US\$49.95. — Academic Press, San Diego, CA, 1999.

The second edition of this text offers a unique approach to mathematical modeling. The author offers an inviting introduction and applies a problem-solving methodology in three major areas of optimization, dynamical systems, and stochastic processes. *Key features include:* A large collection of real-world problems. — An integration of computer outputs from the latest

version of Mathematica<sup>®</sup>, Maple<sup>®</sup>, MINITAB<sup>®</sup>, Lindo<sup>®</sup>. — A systematic five-step modeling method. — Applying calculus, differential equations, linear algebra, and probability. — *New to this edition*: Material on discrete modeling, including integer programming. — Extended treatment of chaos and fractals. — Additional material on linear programming, including the use of spreadsheet tools. — More applications in probability and statistics.

Jiří OUTRATA, Michal KOČVARA, Jochem ZOWE. — **Nonsmooth approach to optimization problems with equilibrium constraints: theory, applications and numerical results.** — Nonconvex optimization and its applications, vol. 28. — Un vol. relié, 17×25, de XXI, 273 p. — ISBN 0-7923-5170-3. — Prix: Dfl. 240.00. — Kluwer Academic Publishers, Dordrecht, 1998.

The book begins with a chapter on auxiliary results followed by a description of the main numerical tools: a bundle method of nonsmooth optimization and a nonsmooth variant of Newton's method. Following this, stability and sensitivity theory for generalized equations is presented, based on the concept of strong regularity. This enables to apply the generalized differential calculus for Lipschitz maps to derive optimality conditions and to arrive at a solution method. A large part of the book focuses on applications coming from continuum mechanics and mathematical economy. A series of nonacademic problems is introduced and analyzed in detail. Each problem is accompanied with examples that show the efficiency of the solution method.

Richard J. NOWAKOWSKI. (Editor). — **Games of no chance: combinatorial games at MSRI, 1994.** — Mathematical Sciences Research Institute publications, vol. 29. — Un vol. broché, 16×23.5, de XIII, 537 p. — ISBN 0-521-57411-0. — Prix: £40.00. — Cambridge University Press, Cambridge, 1998.

This volume represents a significant addition to the literature of combinatorial games. The first part will be accessible to anyone, regardless of background: it contains introductory expositions, reports of unusual tournaments, and an article by Conway on the possibly everlasting contest between an angel and a devil. Next come studies of chess and from the point of view of combinatorial game theory: reports on computer advances such as the solution of nine-men morris and pentominoes; and new theoretical approaches, including extensions of the traditional framework to games with many players, or lacking perfect information, or involving loops. The book closes with an annotated list of unsolved problems and a comprehensive bibliography.

Jack ROBERTSON, William WEBB. — **Cake-cutting algorithms: be fair if you can.** — Un vol. relié, 16×23.5, de X, 181 p. — ISBN 1-65881-076-8. — Prix: US\$38.00. — A.K. Peters, Natick, Massachusetts, 1998.

This book offers a complete treatment of cake-cutting algorithms under all the considered definitions of "fair", and presents them in a coherent, reader-friendly manner. The first seven chapters take a more leisurely and conversational look at the problem; written with the novice in mind, they show the problem's inherent beauty, unhindered by intensive mathematical formalism. The final four chapters are for the non-casual reader and contain technical details of proofs not suited for the first section.

Roman SLOWINSKI. (EDITOR). — **Fuzzy sets in decision analysis, operations research and statistics.** — The Handbooks of fuzzy sets series. — Un vol. relié, XXIV, 453 p. — ISBN 0-7923-8112-2. — Prix: Dfl. 385.00. — Kluwer Academic Publishers, Dordrecht, 1998.

P. Perny, M. Roubens: Fuzzy preference modeling. — M. Grabisch, S.A. Orlovski, R.R. Yager: Fuzzy aggregation of numerical preferences. — J. Fodor, S.A. Orlovski, P. Perny, M. Roubens: The use of fuzzy preference models in multiple criteria choice, ranking and

sorting. — J. Kacprzyk, H. Nurmi: Group decision making under fuzziness. — A. Billot: Elements of fuzzy game theory. — H. Rommelfanger, R. Slowinski: Fuzzy linear programming with single or multiple objective functions. — M. Sakawa: Fuzzy nonlinear programming with single or multiple objective functions. — S. Chanas, D. Kuchta: Discrete fuzzy optimization. — A.O. Esogbue, J. Kacprzyk: Fuzzy dynamic programming. — J. Gebhardt, M. A. Gil, R. Kruse: Fuzzy set-theoretic methods in statistics. — P. Diamond, H. Tanaka: Fuzzy regression analysis. — E. Kerre, T. Onisawa, B. Cappelle, I. Gazdik: Reliability. — A.O. Esogbue, W.E. Hearnings II: Maintenance and replacement models under a fuzzy framework.

### ***Biologie et sciences du comportement***

D.J. DALEY and J. GANI. — **Epidemic modelling: an introduction.** — Cambridge studies in mathematical biology, vol. 15. — Un vol. relié, 15,5×23,5, de XII, 213 p. — ISBN 0-521-64079-2. — Prix: £30.00. — Cambridge, Cambridge University Press, 1999.

This is the general introduction to the ideas and techniques required to understand the mathematical modelling of diseases. It begins with an historical outline of some disease statistics dating from Daniel Bernoulli's smallpox data of 1760. The authors then describe simple deterministic and stochastic models in continuous and discrete time for epidemics taking place in either homogeneous or stratified (nonhomogeneous) populations. A range of techniques for constructing and analysing models is provided, mostly in the context of viral and bacterial diseases of human population. Questions of fitting data to models, and the use of models in understanding methods for controlling the spread of infection are discussed.

### ***Systèmes, contrôle optimal***

Arik A. MELIKYAN. — **Generalized characteristics of first order PDEs: applications in optimal control and differential games.** — Un vol. relié, 16,5×24, de XIV, 310 p. — ISBN 0-8176-3984-5. — Prix: SFr. 148.00. — Birkhäuser Verlag, Basel, 1998.

First-order PDEs possess two types of characteristics: regular (classical) and singular. It is proved that singular surfaces, generally, can be constructed using singular characteristics (SC). Both regular and singular characteristics allow the solution to the PDE to be constructed. The technique developed is called the method of singular characteristics (MSC). A classification of SC is suggested and the corresponding ODE-systems are derived. The MSC is applied to several problems in control and game theory to solve the so-called HJB-equation. Singular paths are investigated in differential games on a Riemannian manifold with nonunique shortest geodesics connecting two points; complete solutions are constructed for games on two-dimensional cones.