# BOOK REVIEW / RESEÑAS

## WAVELET TRANSFORMS AND LOCALIZATION OPERATORS

M. Wong (2002)
Birkhäuser, ISBN 3 7643 6789 X vii+156

This book's main theme is wavelet transformations and localization operators. Different wavelet transforms problems are treated: Weyl-Heisenberg group and the affine group, the spectral theory of wavelet transforms and localization operators, in the form of Schatten-von Neumann norm inequalities.

*G.T. Das*
Savindra Gupta. College

## THE TRAVELING SALESMAN PROBLEM AND ITS, VARIATION

G. Gutin and A. Punnen (Eds) (2002)
Kluwer, ISBN 1 4020 0664 0 xxi+830

The problem of the travelling salesman problem (TSP) is one of the most used combinatorial optimization techniques. It is a hard problem. The developments in polyhedral theory and branch-and-cut algebra have increased the number of instances that can be solved to optimality. This book is devoted to the description of these recent development ; the discussion of the probabilistic aspects, computational analysis of heuristic & metaheuristic algorithms, theoretical analysis of approximation algorithms, discussions of the existent software and different variations (bottleneck TSP, generalized TSP, Prize collecting TSP, maximizing TSP, and orienteering problems). Each of the 16 chapters has been by well known specialists.

*S.V. Choudhuri*
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## COMPUTATIONAL METHODS FOR INVERSE PROBLEMS

C. Vogel (2002)
SIAM ISBN 0 8987 1507 5 xv+183

The area of applications of inverse problems is very broad. The book gives a gobd discussion of available numerical procedures of popular use in the solution of these type of problems. A background of the theory of inverse problems, regularization, and numerical solution techniques are given. Some other topics are image deblurring, total variation regularization, regularization parameter selection methods, parameter identification, nonnegativity constraints. It is recommended to the library of a Mathematical Department with Numerical Analysis interests.

*P.H. Vijayan*
Modern Computation School

# CREDIT SCORING AND ITS APPLICATIONS

L. Thomas, D. Edelman and J. Crook (2002)
SIAM, ISBN 0 8987 1483 4, xvi+248pp

This problem is one in which the interaction of statistics and operational research modeling in finance and banking has obtained remarkable results and Scoring analysis in the industry is being increasing in the last years.

There creditors should cope with two risks: to grant credit to a new applicant (credit scoring) or not and how the credit restrictions for current customers needs to be adjusted, the so called behavioral scoring. The basic theory supporting credit scoring system is presented as well as some practical aspects of the implementation and monitoring of such a system. The principles of the used statistical and operational research methods (think in building scorecards) are presented. A CD-ROM with the date of examples will permit to evaluate a real life problem.

*A.P. Chong*
Advanced School of Business and Administration

# AN INTRODUCTION IN DISCRETE TIME

H. Föllmer and.A. Scheid (2002)
Walter de Gruyter ISBN 3110l7119 8, xxi+422

This textbook provides an introduction to probabilistic methods in finance, when a discrete time stochastic model is used. The book discusses in its first part the arbitrage theory when the mathematical structure is a simple one-period model, the characterisation of arbitrage-free markets, the representation of preferences on asset profiles by expected utility theory and its robust extensions, monetary measures of risk, and an introduction to equilibrium analysis. The second part provides extensions to the dynamics of arbitrage theory and hedging of contingent claims in a multi-period framework.

It is a god book for a course at a MSc level.

*C.P. Lahiri*
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# THE VEHICLE ROUTING PROBLEM

P. Toth and D. Vigo (Eds) (2002) .
SIAM ISBN 0 8987 1498 2; 367pp

This book permits to obtain the state-of-the-art of the methods developed in the decades including some variants of theoretical and practical interest. The book has three parts: the first part provides the basics of Vehicle Routing Problem, and the capacitated counterparts; the second part discusses the cases when time windows, backhauls, pickup and delivery are present; the third part presents the problematic of real-world applications using interesting case studies.

*D.D. Kraheb*
Mohammed School of Computing Science

# A MATHEMATICAL VIEW OF INTERIOR-POINT METHODS IN CONVEX OPTIMIZATION

J. Renegar (2002)
SIAM, lSBN 0 8987 1502 4, 117pp

This book provides the general theory for interior-points methods. A review of the needed theory is given and the interior-point method theory is discussed.The relation of interior-point methods and duality theory is discussed in detail and includes problems as classical duality theory for conic programming, exploration of symmetric cones, development of the general theory of primal-dual algorithms for conic programming optimization, etc. This is- a valuable book for a course.

*V. I. Smith*
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# DECISION MAKING IN MULTICRITERIA ENVIRONMENT: A QUANTITATIVE APPROACH

V. D. Noghin
FIZMATLIT (Moscow), 176 pages.

The book presents through 6 chapters the quantitative theory of the relative importance of Multicriteria methods. It begins with the Notation used and a Preface. The first Chapter is an Introduction where the basic concepts are introduced (the multicriteria choice problem, binary relations; sets of non-dominated decisions, Pareto set etc). The second chapter presents the problem of the relative Importance when two criteria are used and the next chapter the relative importance for two groups of criteria. The fourth chapter discusses Pareto set reducing based on a collection of information on the relative importance of criteria and chapter 5 studies the completeness of information on the relative importance.

Finally Decision making methodology based on the relative importance of criteria is the theme of the last chapter.

This is an interesting book on Multicriteria but only russian speakers will be able to consult it.

*S. Panov*
Cooper & Diaz Engineering and Quality Control Advisors

# INTRODUCTION TO THE THEORY OF TOEPLITZ OPERATORS WITH INFINITE INDEX.

V. Dybin and S.M. Grudsky (2002)
Operator Theory: Advances and Applications Series # 137 xii+209
Birkhäuser ISBN.3.7643.6782.8

We have a superb translation from the original Russian monograph. The book deals with the presentation of the theory of singular equations in a modem fashion, using as backbone the results of the authors, who are renowned authorities in the field.

It has 6 chapters. Chapter one gives the needed definitions and basic results in Toeplitz OperatotTheory, they are introduced trough the discussion of examples. Chapter two establishes the relations between Fredholness Toeplitz Operators and the (p.p) factorization of bounded measurable functions. A generalization is given. Chapter three develops the study of subspaces ker $T(h^{-l})$, the kernels of Toeplitz Operators $T(\alpha)$, $\alpha \in$ fact $(\infty,p,p)$. Standard effects of non classical spectral theory are needed and their connectedness with Toeplitz Operators with $\alpha = \infty$ are established. Chapter four considers the construction of generalized factorization of (discontinuous oscillatory type semi-almost periodic discontinuities, whirl points of power type) symbols. Chapter five introduces the generalized factorization of a-matrix-valued function and the inversibility theory for the corresponding Toeplitz Operator. Chapter six discusses the normalization of $T(\alpha)$ where $\alpha$ is a locally polynomial degenerate.

A large list of references is given at the end of the book grouped by authorship. It is remarkable the weight of the contributions of the authors to the theory since the sixties. They focus the relation of invariant subspaces of the shift operator and some classes of entire and meromorphic functions.

The book is clearly intended for a specialized lectureship stratum within mathematics and related fields.

*Serguei Panev*
Engineering Design & Quality Control Advisors

# TORSION OF 3-DIMENSIONAL MANIFOLDS

V. Turaev (2002)
Progress in Mathematics Series # 208 vii+ 196
Birkhäuser ISBN-3-7643-6911-6

The book treats the behavior of the 3-dimensional topology under a torsion $\tau(M)$ for the first elementary ideal $\pi_1(M)$ and the Alexander polynomial. The relation with a cohomology ring for M, the linking from on torus $H_1(M)$, the Massey products in the cohomology of M and Thurston norm on $H_2(M)$ are also analyzed.

The basic elements are presented in Chapter 1 though the lector needs to master homological algebra and algebraic topology as well as low dimensional topology theory. In Chapter II to IV the author analyzes $\tau$ and different invariant topologies of 3-manifolds. Chapter V studies the effect of a relative torsion in a pair of chain complexes. The homology orientation of a 3-manifold induces a homological orientation in a manifold obtained from it. A solid tori is glued. The gluing of smooth Euler structure is defined as the map U: Vect $(M_o)$ x Vect (M) $\rightarrow$ Vect (M). Chapter VI discusses Euler structures on the solid toris and link exteriors.

Combinatorial counterparts of the gluing are derived. A weak form of duality for torsions is established. In Chapters from VII to VIII he continues with the establishment of a surgery fórmula for $\tau$. Chapter IX to XI are devoted to the reformulation of $\tau$ on a set of Euler structures (gluing form, Moments of the torsion function, the 3-dimensional Q-homology sphere, behavior under connected structures, relations with Massey products, etc.).

This book is recommended for specialists in the theme coming from mathematics and physics and related engineering areas.

*Pasha Powell*
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# GOODNESS OF FIT TESTS AND MODEL VALIDITY

C. Huber-Carol, N. Balakrishnan, M.S. Nikulin and M. Mesbah, Editors (2002)
Operator Theory: Advances and Applications Series # 138 XXXIII+507
Birkhäuser ISBN-3- 7643-4209-9
ISBN 0-6176-4209-9

This book contains papers read at the International Conference on Goodness-of-Fit Tests and Model Validity, which took place at Paris in the period May 29-31,2000. It is part of the commemoration of the century old seminal paper of Karl Pearson.

Part I: History and Fundamentals Contains 3 papers written by all time top statisticians: D.R. Cox, C.R. Rao and P. J. Huber. They deal with the consequences and history of Pearson's paper in statistics. Part II deals with the use of Chi-squared tests in some non-traditional applications. Part III contains five papers, which study how to develop goodness of, fit tests for special cases (exponential and ranked set data). Part IV is devoted to the contributions on tests for regression fitness. The cases they tackled are Gibbs regression, convergence under $\alpha$-mixing process, non-parametric regression. It is remarkable the paper on Regression in Depth of Baroud-Huet-Laurent. Part V is composed by papers that present theoretical models for analyzing the fitness of non-stationary Cox, Cox proportional Hazard, Latent Models and some close problems. Party VI clusters 5 papers on graphical methods while Part VII has 3 contributions related with Rasch's models. The last part contains 8 papers on the kernel of Chi-squared tests. This book is highly recommended for those who deal with these tests. That is practically every statistician. It will be very helpful as a supplementary flource in advanced and graduate courses.

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# PARABOLICITY, VOLTERRA CALCULUS, AND CONICAL SINGULARITIES

S. Albeverio, M. Demuth, E. Schrohe and B. Schulze, Editors (2002)
Operator Theory: Advances and Applications Series # 138 iX+286
Birkhäuser ISBN-3-7643-6906-X

This is a new volume, the OT138$^{th}$ of the series. It contains 5 papers. The first 2 (due to Krainer) establish the role of differential equations as an interface with other areas of mathematics: functional analysis, Lie groups. Differential Geometry among others. They discuss the calculus for pseudodifferential operators with an anisotropic analytical parameter, the algebra of Merlin operators on the ∞-space/time cylinder and its relation with conical singularities. The third paper (Krainer-Schulze) is some kind of kernel of the ouvre, it has 182 pages). Precise information on the asymptotic, in the sense of 'long-time', of the solution for parabolic equations and the inverse corresponding to the calculus. The algebra constructed contains the classic system of parabolic equations of general form and their inverses. The next chapter (Witt) presents a factorization theorem for meromorphic symbols, which permits its application to the index theory and the construction of sub-calculus of the cone calculus. The last paper (Kapandze-Schlza-Witt) establishes that the cone algebra with discrete asymptotic on the manifold with conical singularity is invariant under natural coordinate changes.

This is a highly specialized collection of papers, which is of interest for mathematicians, physics and other scientists working with applications of Differential equations.

*Amita Pal*
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# AUTOMORPHIC PSEUDODIFFERENTIAL ANALYSIS AND HIGHER LEVEL WEYL CALCULI

A. Unterberger (2002)
Progreess in Mathematics Series # 209 X+246
Birkäuser ISBN-3-7643-6909-4

This book has been awarded with tbe renowned prize, for mathematical monographs; Ferran Sunyer i Balaguer. The homonymous foundation and the Institut d'Etudes Catalans created and the contest is going on since 1992. An internatlonal committee assigns it.

The author presents automorphic distributions and related operators, using the connections between distributions and non-holomorphlc modular forms by using Weyl Calculus for pseudodifferential operators. The automorphic distributions are interpreted as symbols of operators. The way of going into non-holomorphic modular forms is interesting and new.

The readers should have certain knowledge on pseudodifferential analysis modular form theory and quantization. theory. A new approach is introduced in the book for computing different formulae. The author suggests which are the perspectives of dIfferent problems in Quantization Theory.

It is a good book for specialized PhD courses.

*Peter P. Johnson*
BROUQUE S.A. de CV

# HANDBOOK OF BROWNIAN MOTIONS –FACTS AND FORMULAE

(2$^{nd}$. Edition)
A.N. Borodin and P.Salmunen(2002)
Probability and its Applications Series # 138 XV+672
Birkhäuser ISBN-3- 7643-6705-9

This is an enlarged version of the 1996's edition. It includes more formulae and tables including equivalent formulae and references. The new size is 1/3 larger than the previous one. It is divided into 2 parts. The first one presents the theory of lower diffusions and Brownian Motion (BM). It has 6 chapters that present the generalities of stochastic processes, linear diffusion, stochastic calculus, BM, local time as Markov processes and Diffusion Systems associated to BM. They contain the needed definitions and theoretical results.

The second part consists of Tables of functionals of BM and related processes. It has 9 chapters. Each one groups formulae and tables of BM, BM with drift, the reflection of BM, Bessel processes of order v, ½ and zero, Ornstein-Uhlenbeck processes and radial isometric BM.

Five appendixes are used for presenting some special functions as the Laplace Inverse Transforms, for discussing on diffusion, the solution of differential equations.

I recommend it for the departments where Stochastic Processes is one of the fields of research or teaching.

*Juan C. Camejo López*
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# THE RELATIVISTIC BOLTZMANN EQUATION: THEORY AND APPLICATIONS

C.Cercignani and G.M. Kremer (2002)
Progress in Mathematical Physics x+384
Birkhäuser ISBN-3- 7643-6693-1

This is a contribution in the area of the theory of relativistic Boltzmann equations. It will be a helpful book for advanced courses on relativistic kinetic theory. Chapter one introduces the elements needed for dealing with the basics in special relativistic and tensor Analysis in Minkovsky spaces. That allows the announced the self-containedness of the book. The second chapter extends the relativistic theory concepts to kinetic and introduces the relativistic Boltzmann equation in this context. The considered gas is single and non degenerate relativistic. Uehling-Uhlenbeck equation and the quasi-classic Boltzmann equation are derived. The concept of summatorial invariance is discussed in deep as well as the macroscopic description of a relativistic gas. The equilibrium distribution function is derived for  motivating a discussion of the equilibrium. Chapter three uses these results for presenting a theory of equilibrium. The thermodynamics model equation, wave phenomena, General relativity. Gravitational fields. The book ends with a deep study of the relativistic Vlasov equation system. They encourage the development of systems that contain gravity and electromagnetism.

*A. S. Akiva*
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Fractals in Gaz 2001

# ANALYSIS DYNAMICS, GEOMETRY, STOCHASTIC

P. Grabner and W. Woess , Editors (2003)
Trends in Mathematics: viii+ 283
Birkhäuser ISBN-3-7643-7006-8

The proceeding of the homonymous conference is the content of this volume. The conference took place in /June 2001 at Graz at Sytria, Austria. The papers have been invited by the editors and they give a panoramic view of what is going on in potential theory, random walks, spectral theory, fractal groups, dynamic systems, etc. Twelve papers conform the contents. 88 persons are listed as conference attendants.

I think at it will be a good acquisition for the persons trying to be in the front line of fractal theory and practice.

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# FOUNDATIONS OF STATISTICAL ANALYSES AND APPLICATIONS WITH SAS

M. Falk, f. Marohn and B. Tewes (2002)
Birkhäuser ix+ 398 ISBN-3- 7643-6893-4

We can consider this book as a text for an introductory course for non-mathematicians. It goes into data analysis and uses the minimum of probability. The backbone, look the title, is the use of SAS computer Package. Hence the examples go through the solution by using it. The performance of SAS and the frequency of use of the modules weight the chapters. It starts, as expected, with Data Analysis including variance stabilizing transformations. The second chapter goes into Normal distribution uses: properties, what how to study the mean and variance using this distribution and fInishes with the Wilcoxon alternatives. The third chapter is devoted to regression and the fourth to Categorical Data Analysis. The sequel is Analysis of Variance (one and two way), Discriminant Analysis (including the use of density function estimation), Cluster Analysis, and Principal Components. Three Appendices introduce SAS (modules, programming possibilities and needs and some procedures. A compact list of references is given.

As I quoted at the beginning it should be a valuable book in the shelf of the teachers of statistics for consulting how to deal with SAS in common applications, and a good text for a one-semester course. I consider it especially good for a graduate course for the social sciences.

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