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all three of these areas, and are so basic and elementary that it is worthwhile to collect them together so that more advanced expositions can be given without having to start from the very beginning. The concepts are concerned with the general basic theory of differential manifolds. As a result, this book can be viewed as a prerequisite to *Fundamentals of Differential Geometry*. Since this book is intended as a text to follow advanced calculus, manifolds are assumed finite dimensional. In the new edition, the author has made numerous corrections to the text and he has added a chapter on applications of Stokes' theorem.

Yiming LONG. — **Index theory for symplectic paths with applications.** — Progress in mathematics, vol. 207. — Un vol. relié, 16×24, de XXIV, 380 p. — ISBN 3-7643-647-8. — Prix: SFr. 168.00. — Birkhäuser, Basel, 2002.

This book gives a systematic introduction to the index theory for symplectic matrix paths and its iteration theory, as well as applications to periodic solution problems of nonlinear Hamiltonian systems. Among the topics covered are the algebraic and topological properties of symplectic matrices and groups, the index theory for symplectic paths, relations with other Morse-type index theories, Bott-type iteration formulae, splitting numbers, precise index iteration formulae, various index iteration inequalities, and common index properties of finitely many symplectic paths. The applications of these concepts yield new approaches to some outstanding problems and important progress on their solutions. Particular attention is given to the minimal period solution problem of Hamiltonian systems, the existence of infinitely many periodic points of the Poincaré map of Lagrangian systems on tori, and the multiplicity and stability problems of closed characteristics on convex compact smooth hypersurfaces in $2n$ -dimensional Euclidean vector space.

Probabilités et processus stochastiques

Klaus BICHTLER. — **Stochastic integration with jumps.** — Encyclopedia of mathematics and its applications, vol. 89. — Un vol. relié, 16×24, de XIII, 501 p. — ISBN 0-521-81129-5. — Prix: £70.00. — Cambridge University Press, Cambridge, 2002.

Stochastic processes with jumps and random measures are gaining importance as drivers in applications like financial mathematics and signal processing. This book develops the stochastic integration theory for both integrators (semimartingales) and random measures from a common point of view. Highlights feature the DCT and Egoroff's theorem, as well as comprehensive analogs to results from ordinary integration theory, for instance, previsible envelopes and an algorithm computing stochastic integrals of càglàd integrands pathwise. Full proofs are given for all results, and motivation is stressed throughout. A large appendix contains most of the analysis that readers will need as a prerequisite. A comprehensive reference list and index of notation are also provided. Extra material is available from the book's Web site at <http://www.ma.utexas.edu/users/cup>.

Erwin BOLTHAUSEN, Alain-Sol SZNITMAN. — **Ten lectures on random media.** — DMV Seminar, vol. 32. — Un vol. broché, 24×17, 116 p. — ISBN 3-7643-6703-2. — Prix: SFr. 42.00. — Birkhäuser, Basel, 2002.

The field of random media has been the object of intensive activity over the last twenty-five years. It gathers a variety of models generally originating from physical sciences, where certain materials or substances have defects or inhomogeneities. This feature can be taken into account by letting the medium be random. Randomness in the medium turns out to cause very unexpected effects, especially in the large-scale behavior of some of these models. What in the beginning was often deemed to be a simple toy-model ended up as a major mathematical

challenge. After more than twenty years of intensive research in this field, certain new paradigms and some general methods have emerged, and the surprising results on the asymptotic behavior of individual models are now better understood in more general frameworks.

Andrei N. BORODIN, Paavo SALMINEN. — **Handbook of Brownian motion: facts and formulae**. — Second edition — Probability and its applications. — Un vol. relié, 24×16, de xv, 672 p. — ISBN 3-7643-6705-9. — Prix: SFr. 198.00. — Birkhäuser, Basel, 2002.

The purpose of this book is to give an easy reference to a large number of facts and formulae associated with Brownian motion. The book consists of two parts. The first one – theory part – is devoted to properties of linear diffusions in general and Brownian motion in particular. Results are given mainly without proofs. The second one – formula part – is a table of distributions of functionals of Brownian motion and related processes. The collection contains more than 2500 numbered formulae. Compared with the first edition published in 1996, this second edition has been revised and considerably expanded. More than 1000 new formulae have been added to the tables and, in particular, geometric Brownian motion is covered both in the theoretical and the formula part of the book.

El-Kébir BOUKAS, Zi-Kuan LIU. — **Deterministic and stochastic time delay systems**. — Control engineering. — Un vol. relié, 24×16, de xvi, 423 p. — ISBN 0-8176-4245-5. — Prix: SFr. 181.00. — Birkhäuser, Boston, 2002.

This book presents recent developments on the class of uncertain deterministic and stochastic dynamical systems with time delay. Problems such as stochastic stability, stabilizability under memory and memoryless state feedback controller and output feedback control, H_∞ control, and filtering and their robustness are treated. Practical implications of the different methods are considered, and numerical algorithms are provided for implementation. — *Features and topics*: New results in the area of uncertain dynamical systems with time delay are presented; all results use the LMI techniques, which are becoming the standard in control theory; the difference between deterministic dynamical systems with time delay and stochastic dynamical systems with time delay is clarified; both delay-independent and delay-dependent conditions are explained; algorithms are developed to solve different problems in stability and stabilizability.

Robert C. DALANG, Marco DOZZI, Francesco RUSSO, (Editors). — **Seminar on stochastic analysis, random fields and applications III : Centro Stefano Franscini, Ascona, September 1999**. — Progress in probability, vol. 52. — Un vol. relié, 17×24, de xvii, 302 p. — ISBN 3-7643-6721-0. — Prix: SFr. 146.00. — Birkhäuser, Basel, 2002.

This volume contains 20 refereed research or review papers presented at the five-day Third Seminar on Stochastic Analysis, Random Fields and Applications which took place at the Centro Stefano Franscini (Monte Verità) in Ascona, Switzerland, from September 20 to 24, 1999. The seminar focused on three topics: fundamental aspects of stochastic analysis, physical modeling, and applications to financial engineering. The third topic was the subject of a Minisymposium on Stochastic Methods in Financial Models.

Giuseppe DA PRATO, Luciano TUBARO, (Editors). — **Stochastic partial differential equations and applications**. — Lecture notes in pure and applied mathematics, vol. 227. — Un vol. broché, 17,5×25, de ix, 460 p. — ISBN 0-8247-0792-3. — Prix: US\$ 180.00 — Marcel Dekker, New York, 2002.

Based on the proceedings of the 5th International Conference on Stochastic Partial Differential Equations and Applications held in Trento, Italy, this reference book offers state of

the art applications in filtering theory, stochastic quantization, quantum probability, and mathematical finance. It analyzes the latest developments in the study of quantum random fields, control theory, white noise and fluid dynamics, and provides precise conditions for nontrivial and well-defined scattering, new Gaussian noise terms, models depicting the asymptotic behavior and evolution equations, and solutions to filtering dilemmas in signal processing.

Dominique FOATA, Aimé FUCHS. — **Processus stochastiques: processus de Poisson, chaînes de Markov et martingales: cours et exercices corrigés.** — Un vol. relié, 17×24, de XIII, 236 p. — ISBN 2 10 006501 7. — Prix : € 25.00. — Dunod, Paris, 2002.

Ce livre s'adresse aux étudiants de maîtrise de mathématiques appliquées et d'informatique (bac+4), ainsi qu'aux élèves des grandes écoles d'ingénieurs, qui s'orientent vers la recherche opérationnelle. Il présuppose la connaissance d'un cours de probabilités de base, comme celui qui est exposé dans le livre *Calcul des probabilités*, écrit par les mêmes auteurs. On y trouve un exposé sur le processus de Poisson, les chaînes de Markov et les martingales à temps discret, ainsi qu'une brève introduction au mouvement brownien. Le livre comporte de nombreux exercices, dont la solution est généralement détaillée et un chapitre d'exemples d'applications, dans lesquels les différents processus sont utilisés.

Hans FÖLLMER, Alexander SCHIED. — **Stochastic finance: an introduction in discrete time.** — De Gruyter studies in mathematics, vol. 27. — Un vol. relié, 17,5×24, de IX, 422 p. — ISBN 3-11-017119-8. — Prix : € 50.47. — Walter de Gruyter, Berlin, 2002.

This book is an introduction to financial mathematics. It is intended for graduate students in mathematics and for researchers working in academia and industry. The focus on stochastic models in discrete time has two immediate benefits. First, the probabilistic machinery is simpler, and one can discuss right away some of the key problems in the theory of pricing and hedging of financial derivatives. Second, the paradigm of a complete financial market, where all derivatives admit a perfect hedge, becomes the exception rather than the rule. Thus, the need to confront the problems arising in incomplete financial market models appears at a very early stage. The first part studies a simple one-period model which serves as a building stone for later developments. In the second part, the idea of dynamic hedging of contingent claims is developed in a multi-period framework. The text captures the interplay between probability theory and functional analysis which has been crucial for recent advances in mathematical finance.

Joseph GLAZ, Joseph NAUS, Sylvan WALLENSTEIN. — **Scan statistics.** — Springer series in statistics. — Un vol. relié, 16×24, de XV, 370 p. — ISBN 0-387-98819-X. — Prix : € 89.95. — Springer, Berlin, 2001.

Scan statistics are used to analyze the occurrence of observed clusters of events in time and space. Scientists seek to determine whether an observed cluster of events has occurred by chance or if it signals a departure from the underlying probability model for the observed data. This book gives broad and up-to-date coverage of exact results, approximations, and bounds for scan statistics with a view towards applications. The first part consists of six chapters and is focused on the use of scan statistics in applications. Each chapter discusses in great detail the methods related to a particular scan statistic, applying them to the area of astronomy, medicine, molecular biology, and quality control. The second part of the book consists of twelve chapters and presents the development of the theory and methods of scan statistics. Both one- and two-dimensional discrete and continuous scan statistics are discussed in great detail. Separate chapters are devoted to exact results, approximations, and bounds for scan statistics.

Olle HÄGGSTRÖM. — **Finite Markov chains and algorithmic applications.** — London Mathematical Society student texts, vol. 52. — Un vol. broché, 15×23, de ix, 114 p. — ISBN 0-521-89001-2. — Prix: £ 14.95. — Cambridge University Press, Cambridge, 2002.

Based on a lecture course given at Chalmers University of Technology, this book is ideal for advanced undergraduate or beginning graduate students. The author first develops the necessary background in probability theory and Markov chains before applying it to study a range of randomized algorithms with important applications in optimization and other problems in computing. Amongst the algorithms covered are the Markov chain, Monte Carlo method, simulated annealing, and the recently developed Propp-Wilson algorithm. This book will appeal not only to mathematicians, but also to students of statistics and computer science.

J. O. RAMSAY, B.W. SILVERMAN. — **Applied functional data analysis: methods and case studies.** — Springer Series in Statistics. — Un vol. broché, 15,5×23,5, de x, 190 p. — ISBN 0-387-95414-7. — Prix: € 59.95. — Springer, New York, 2002.

What do juggling, old bones, criminal careers, and human growth patterns have in common? They all give rise to functional data, which come in the form of curves or functions rather than the numbers, or vectors of numbers, that are considered in conventional statistics. The authors' highly acclaimed book *Functional Data Analysis* (1997) presented a thematic approach to the statistical analysis of such data. By contrast, the present book introduces and explores the ideas of functional data analysis by the consideration of a number of case studies, many of them presented for the first time. The two books are complementary, but neither is a prerequisite for the other. The case studies are accessible to research workers in a wide range of disciplines. Every reader, whether experienced researcher or graduate student, should gain not only a specific understanding of the methods of functional data analysis, but, more importantly, a general insight into the underlying patterns of thought. There is an associated Web site with MATLAB and S-PLUS implementations of the methods discussed, together with all the data sets that are not proprietary.

Rinaldo B. SCHINAZI. — **Probability with statistical applications.** — Un vol. broché, 23,5×15,5, de xii, 2185 p. — ISBN 0-8176-4247-1. — Prix: SFr. 102.00. — Birkhäuser, Boston, 2002.

This concise text is intended for a one-semester course, and offers a practical introduction to probability for undergraduates at all levels with different backgrounds and views towards applications. Only basic calculus is required. However, the book is written so that the calculus difficulties of students do not obscure the probability content in the first six chapters. Thus, the exposition initially focuses on fundamental probability concepts and an easy introduction to statistics. Theory is kept to a minimum here, the striking feature being numerous exercises and examples. Chapters 7 and 8 rely heavily on the calculus of one and several variables to study sums of random variables (via moment generating functions) and transformations of random variables (using distribution functions) and transformations of random vectors. In Chapter 8 a number of facts are proved with respect to expectation, variance and covariance, and normal samples.

Vladas SIDORAVICIUS, (Editor). — **In and out of equilibrium: probability with a physics flavor.** — Progress in Probability, vol. 51. — Un vol. relié, 24×16, de vi, 472 p. — ISBN 0-8176-4289-7. — Prix: SFr. 198.00. — Birkhäuser, Boston, 2002.

The intersection of probability and physics has been a rich and explosive area of growth in the past two decades, specifically covering such subjects as percolation theory, random walks,

interacting particle systems, and various topics related to statistical mechanics. In the last several years, substantial progress has been made in a number of directions: fluctuations of 2-dimensional growth processes, Wulf constructions in higher dimensions for percolation, Potts and Ising models, classification of random walks in random environments, the introduction of the stochastic Loewner equation, the rigorous proof of intersection exponents for planar Brownian motion, and finally the proof of conformal invariance for critical percolation on the triangular lattice. All of the articles are an outgrowth of the fourth Brazilian School of Probability, held in Mambucaba, Brazil, August 2000.

Statistique

C. HUBER-CAROL, N. BALAKRISHNAN, M. S. NIKULIN, M. MESBAH, (Editors). — **Goodness-of-fit tests and model validity**. — Statistics for industry and technology. — Un vol. relié, 18×26, de xxxiii, 507 p. — ISBN 0-8176-4209-9. — Prix: SFr. 198.00. — Birkhäuser, Boston, 2002.

The 37 expository articles in this volume provide broad coverage of important topics relating to the theory, methods, and applications of goodness-of-fit tests and model validity. The book is divided into eight parts, each of which presents topics written by expert researchers in their areas. Key features include: state-of-the-art exposition of modern model validity methods, graphical techniques, and computer-intensive methods; systematic presentation with sufficient history and coverage of the fundamentals of the subject; exposure to recent research and a variety of open problems; many interesting real-life examples for practitioners; extensive bibliography, with special emphasis on recent literature; subject index. This comprehensive reference work will serve the statistical and applied mathematics communities as well as practitioners in the field.

Konstantin PROTASSOV. — **Analyse statistique des données expérimentales**. — Collection Grenoble sciences. — Un vol. broché, 17×25, de 148 p. — ISBN 2-86883-590-2. — Prix: € 13.71. — EDP Sciences, Les Ulis, 2002.

Après une rapide présentation des causes d'incertitudes, les distributions les plus connues sont présentées. Ensuite, des notions plus complexes de statistique sont abordées. Cette partie peut être parcourue rapidement par ceux qui désirent utiliser les résultats sans entrer dans les aspects théoriques. Par contre, une lecture plus attentive permet de comprendre les corrélations qui existent entre les diverses distributions et pourquoi telle distribution est adaptée à telles conditions de mesure. Le lecteur possède ainsi les outils nécessaires à l'analyse des données expérimentales dans différentes situations (petit nombre de mesures, deux mesures, propagation des erreurs, précision de l'incertitude, ajustement de fonction). Des conseils pratiques sont proposés. Ils permettent d'améliorer les mesures des expériences et leur analyse.

Lothar SACHS. — **Angewandte Statistik: Anwendung statistischer Methoden**. — Zehnte, überarbeitete und aktualisierte Auflage. — Un vol. broché, 16,5×24, de xxxvii, 889 p. — ISBN 3-540-42448-2. — Prix: € 49.95. — Springer, Berlin, 2002.

Dieses Buch erläutert statistische Ansätze, ergänzt die Software und gibt leichtfasslich, anschaulich und praxisnah Schülern, Studenten, Praktikern und Dozenten die notwendigen Details, um Daten zu gewinnen, zu beschreiben und zu beurteilen. Es dient zum Lernen, Anwenden und Nachschlagen bei unterschiedlichen Vorkenntnissen und breitgestreuten Interessen in Schulen, Hochschulen und in der Praxis. Neben zahlreichen Hinweisen und Empfehlungen zur Planung und Auswertung von Studien, einer anschaulich und anwenderbezogenen Darstellung von Konzepten, Begriffen, Beziehungen, Fehlerquellen und Fallstricken,