

# Probabilités et processus stochastiques

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along with the geometry, dimension and local connectivity of Julia sets. In addition to presenting new work, this collection documents important results hitherto unpublished or difficult to find in the literature.

Gabriel P. PATERNAIN. — **Geodesic flows.** — Progress in mathematics, vol. 180. — Un vol. relié, 16×24, de XII, 149 p. — ISBN 0-8176-4144-0. — Prix: SFr. 88.00. — Birkhäuser, Boston, 1999.

The work begins with a concise introduction to the geodesic flow of a complete Riemannian manifold, emphasizing its symplectic properties and culminating with various applications, such as the non-existence of continuous invariant Lagrangian subbundles for manifolds with conjugate points. Subsequent chapters develop the relationship between the exponential growth rate of the average number of geodesic arcs between two points in the manifold and the topological entropy of the geodesic flow. A complete proof of Mané's formula relating these two quantities is presented. A final chapter explores the link between the topological entropy of the geodesic flow and the homology of the loop space of a manifold.

Nikolai SAVELIEV. — **Lectures on the topology of 3-manifolds: an introduction to the Casson invariant.** — De Gruyter textbook. — Un vol. broché, 17×24, de IX, 199 p. — ISBN 3-11-016271-7. — Prix: DM 59.00. — Walter de Gruyter, Berlin, 1999.

Progress in low-dimensional topology has been very fast in the last two decades, leading to the solutions of many difficult problems. One of the consequences of this "acceleration of history" is that many results have only appeared in professional journals and monographs. The purpose of this book is to provide a much-needed bridge to these modern topics. The book covers some classical topics, such as Heegaard splittings, Dehn surgery, and invariants of knots and links. It proceeds through the Kirby calculus and Rohlin's theorem to Casson's invariant and its applications, and gives a brief sketch of links with the latest developments in low-dimensional topology and gauge theory.

### ***Probabilités et processus stochastiques***

Richard M. DUDLEY. — **Uniform central limit theorems.** — Cambridge studies in advanced mathematics, vol. 63. — Un vol. relié, 16×24, de XIV, 436 p. — ISBN 0-521-46102-2. — Prix: £55.00. — Cambridge University Press, Cambridge, 1999.

This book shows how the central limit theorem for independent, identically distributed random variables with values in general, multidimensional spaces, holds uniformly over some large classes of functions. The book contains, with complete proofs, the Fernique-Talagrand majorizing measure theorem for Gaussian processes, an extended treatment of Vapnik-Černovenkis combinatorics, the Ossiander  $L^2$  bracketing central limit theorem, the Giné-Zinn bootstrap central limit theorem in probability, the Bronstein theorem on approximation of convex sets, and the Shor theorem on rates of convergence over lower layers. The book incorporates an updated form of the author's 1984 St.-Flour lecture notes and also gives various results of the author's not previously collected in one place.

Dominique FOATA, Aimé FUCHS. — **Wahrscheinlichkeitsrechnung.** — Grundstudium Mathematik. — Un vol. broché, 17×24, de XV, 383 p. — ISBN 3-7643-6169-7. — Prix: SFr. 42.00 (relié: SFr. 88.00). — Birkhäuser, Basel, 1999.

Die vorliegende Einführung richtet sich an Studenten, die bereits einen Grundkurs in Analysis besucht haben, und zeichnet sich durch einen hervorragenden didaktischen Aufbau aus. Sowohl die diskrete wie auch die masstheoretische Wahrscheinlichkeitstheorie werden in

allen wesentlichen Elementen behandelt und alle wichtigen Sätze werden bewiesen. Viele Übungen helfen den Stoff einzuarbeiten und zu vertiefen. Alle Lösungen, oftmals sehr detailliert, sind im Buch enthalten und der ausführliche Index erleichtert das Nachschlagen. Anders als üblich werden sowohl die diskrete wie die masstheoretische Wahrscheinlichkeit abgehandelt.

Jean-François LE GALL. — **Spatial branching processes, random snakes and partial differential equations.** — Lectures in mathematics, ETH Zürich. — Un vol. broché, 17×24, de VIII, 162 p. — ISBN 3-7643-6126-3. — Prix: SFr. 38.00. — Birkhäuser, Basel, 1999.

The text includes a presentation of the measure-valued branching processes also called superprocesses and of their basic properties. In the important quadratic branching case, the path-valued process known as the Brownian snake is used to give a concrete and powerful representation of superprocesses. This representation is applied to several connections with a class of semilinear partial differential equations. On the one hand, these connections give insight into properties of superprocesses. On the other hand, the probabilistic point of view sometimes leads to new analytic results, concerning for instance the trace classification of positive solutions in a smooth domain. An important tool is the analysis of random trees coded by linear Brownian motion.

Masao NAGASAWA. — **Stochastic processes in quantum physics.** — Monographs in mathematics, vol. 94. — Un vol. relié, 18×24, de VII, 598 p. — ISBN 3-7643-6208-1. — Prix: SFr. 168.00. — Birkhäuser, Basel, 2000.

Together with known techniques, some new stochastic methods are applied in solving the equation of motion and the equation of dynamics of relativistic quantum particles. The problem of the origin of universes is discussed as an application of the theory. The text is almost self-contained and requires only an elementary knowledge of probability theory at the graduate level, and some selected chapters can be used as (sub)-textbooks for advanced courses on stochastic processes, quantum theory and theoretical chemistry.

Massimo PICARDELLO, Wolfgang WOESS, (Editors). — **Random walks and discrete potential theory: Cortona 1997.** — Symposia mathematica, vol. 39. — Un vol. relié, 16,5×23,5, de VIII, 361 p. — ISBN 0-521-77312-1. — Prix: £40.00. — Cambridge University Press, Cambridge, 1999.

This book covers the interplay between the behaviour of a class of stochastic processes (random walks) and structure theory. Written by leading researchers, this collection of invited papers presents links with spectral theory and discrete potential theory, besides probabilistic and structure theoretic aspects. Its interdisciplinary approach spans several areas of mathematics including geometric group theory, discrete geometry and harmonic analysis, and will be of interest to researchers and post-graduate students, both in mathematics and statistical physics.

Pál RÉVÉSZ, Bálint TÓTH. — **Random walks.** — Bolyai Society Mathematical Studies, vol. 9. — Un vol. relié, 17,5×24,5, de 384 p. — ISBN 963-8022-91-4. — János Bolyai Mathematical Society, Budapest, 1999.

R.C. Bradley: Can a theorem of Csáki and Fischer provide a key to Ibragimov's conjecture? — E. Csáki, A. Földes, P. Révész, Z. Shi: On the excursions of two-dimensional random walk and Wiener process. — M. Csörgő: Random walking around financial mathematics. — B. Davis: Reinforced and perturbed random walks. — N. Gantert, O. Zeitouni: Large deviations for one-dimensional random walk in random environment – a survey. — J. Gravner, D. Griffeath: Scaling laws for a class of critical cellular automaton growth rules. — Y. Hu, M. Yor: Asymptotic studies of Brownian functionals. — G. Lawler: Geometric and fractal

properties of Brownian motion and random walk paths in two and three dimensions. — S.G. Mohanty: Combinatorial aspects of some random walks. — G. Pap, M. Voit: Rates of convergence for the central limit theorems for random walks related with the Hankel transform. — P. Révész: Critical branching Wiener process. — B. Tóth: Self-interacting random motions — a survey.

Ken-Iti SATO. — **Lévy processes and infinitely divisible distributions.** — Cambridge studies in advanced mathematics, vol. 68. — Un vol. relié, 16×24, de XII, 486 p. — ISBN 0-521-55302-4. — Prix: £50.00. — Cambridge University Press, Cambridge, 1999.

Lévy processes are rich mathematical objects and constitute perhaps the most basic class of stochastic processes with a continuous time parameter. This book is intended to provide the reader with comprehensive basic knowledge of Lévy processes, and at the same time serve as an introduction to stochastic processes in general. No specialist knowledge is assumed and proofs are given in detail. Systematic study is made of stable and semi-stable processes, and the author gives special emphasis to the correspondence between Lévy processes and infinitely divisible distributions.

Daniel W. STROOCK. — **Probability theory: an analytic view.** — Revised edition. — Un vol. relié, 18×26, de XVI, 536 p. — ISBN 0-521-66349-0. — Prix: £18.95. — Cambridge University Press, Cambridge, 1999.

This book is intended for graduate students who have a good undergraduate introduction to probability theory, a reasonably sophisticated introduction to modern analysis and want to learn what these two topics have to say about each other. By modern standards, the topics treated here are classical and the techniques used far-ranging. No attempt has been made to present the subject as a monolithic structure resting on a few basic principles. The first part of the book deals with independent random variables, central limit phenomena, the general theory of weak convergence and several of its applications, as well as elements of both the Gaussian and Markovian theories of measures on function space. The introduction of conditional expectation values is postponed until the second part of the book, where it is applied to the study of martingales. This section also explores the connection between martingales and various aspects of classical analysis, and the connections between Wiener's measure and classical potential theory.

Sara A. VAN DE GEER. — **Applications of empirical process theory.** — Cambridge series in statistical and probabilistic mathematics. — Un vol. relié, 18×26, de XII, 286 p. — ISBN 0-521-65002-X. — Prix: £35.00. — Cambridge University Press, Cambridge, 2000.

This book reveals the relation between the asymptotic behaviour of M-estimators and the complexity of parameter space. Virtually all results are proved using only elementary ideas developed within the book; there is minimal recourse to abstract theoretical results. To make the results concrete, a detailed treatment is presented for two important examples of M-estimation, namely maximum likelihood and least squares. The theory also covers estimation methods using penalties and sieves. Many illustrative examples are given, including the Grenander estimator, estimation of functions of bounded variation, smoothing splines, partially linear models, mixture models and image analysis.

Wolfgang WOESS. — **Random walks on infinite graphs and groups.** — Cambridge tracts in mathematics, vol. 138. — Un vol. relié, 16×23,5, de XI, 334 p. — ISBN 0-521-55292-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2000.

The main theme of this book is the interplay between the behaviour of a class of stochastic processes (random walks) and discrete structure theory. The author considers Markov chains

whose state space is equipped with the structure of an infinite, locally-finite graph, or as a particular case, of a finitely generated group. The transition probabilities are assumed to be adapted to the underlying structure in some way that must be specified precisely in each case. From the probabilistic viewpoint, the question is what impact the particular type of structure has on various aspects of the behaviour of the random walk. Conversely, random walks may also be seen as a useful tool for classifying, or at least describing, the structure of graphs and groups. Links with spectral theory and discrete potential theory are also discussed.

## **Statistique**

Cees DIKS. — **Nonlinear time series analysis: methods and applications.** — Nonlinear time series and chaos, vol. 4. — Un vol. relié, 16×22,5, de VII, 209 p. — ISBN 981-02-3505-4. — Prix: £ 18.00. — World Scientific, Singapore, 1999.

The currently established methods for the analysis of time series were developed mainly in two fields: statistical time series analysis and the theory of dynamical systems. A prolific cross-fertilization has recently started to develop between these areas, and it is the author's intention to present some theory and methods in view of this development, indicating the connections between the two fields wherever possible. The author has tried to keep the material accessible to a readership with an interest in nonlinear time series analysis from a wide variety of research areas; only modest mathematical background knowledge is assumed and examples are given throughout to illustrate the ideas behind the methods presented.

Subir GHOSH, (Editor). — **Multivariate analysis, design of experiments, and survey sampling.** — Statistics: textbooks and monographs, vol. 159. — Un vol. relié, 16,5×23,5, de XVIII, 663 p. — ISBN 0-8247-0052-X. — Prix: US\$ 195.00. — Marcel Dekker, New York, 1999.

Featuring the work of nearly 50 international leaders, this book provides a risk prediction model for optimally selecting inspection samples from shipments containing items of highly variable monetary value... reviews recent progress on obtaining approximation to sampling distributions involved in sequentially designed experiments... studies the influence of random effects on the hazard rate, survival function, and other measures of dependence in survival models... investigates statistical model evaluation problems from an information theoretic point of view... considers the effects of elliptical populations for test statistics from multivariate normal theory... supplies a nonstandard introduction to (multiple) correspondence analysis and some of its generalizations... discusses generalized multivariate analysis of variance (MANOVA) models... analyzes work on the Bayesian analysis and design of  $M/M/c$  (including  $M/M/1$  and  $M/M/\infty$ ) queues... and more.

J.R. HIGGINS and R.L. STENS, (Editors). — **Sampling theory in Fourier and signal analysis: advanced topics.** — Oxford science publications. — Un vol. relié, 16×24, de XIII, 296 p. — ISBN 0-19-853496-5. — Prix: £ 60.00. — Oxford University Press, Oxford, 1999.

P.L. Butzer, M. Hauss: Applications of sampling theory to combinatorial analysis, Stirling numbers, special functions and the Riemann zeta function. — W.J. Walker: Sampling theory and the arithmetic Fourier transform. — J.R. Higgins: Derivative sampling – a paradigm example of multichannel methods. — D.H. Mugler: Computational methods in linear prediction for band-limited signals based on past samples. — W.N. Everitt and G. Nasri-Roudsari: Interpolation and sampling theories and linear ordinary boundary value problems. —