

Analyse numérique

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ground level and up', and to wavelet-based statistical analysis of time series. It focuses on practical discrete time techniques, with detailed descriptions of the theory and algorithms needed to understand and implement the discrete wavelet transforms. Numerous examples illustrate the techniques on actual time series. The many embedded exercises – with full solutions provided in the appendix – allow use of the book for self-guided study; additional exercises can be used in a classroom setting. A Web site gives access to the time series and wavelets used in the book, as well as information on accessing software in S-Plus and other languages. This book will be welcomed by all students and researchers wishing to use wavelet methods to analyse time series.

B.G. QUINN, E.J. HANNAN. — **The estimation and tracking of frequency.** — Cambridge series in statistical and probabilistic mathematics. — Un vol. relié, 18,5×26, de xi, 266 p. — ISBN 0-521-80446-9. — Prix: £37.50. — Cambridge University Press, Cambridge, 2001.

Many electronic and acoustic signals can be modelled as sums of sinusoids and noise. However, the amplitudes, phases and frequencies of the sinusoids are often unknown and must be estimated in order to characterise the periodicity or near-periodicity of the signal. The problem of tracking slow frequency changes over time of a very noisy sinusoid is also considered. Rigorous analyses are presented via asymptotic or large sample theory, together with physical insight. The book focuses on achieving extremely accurate estimates when the signal to noise ratio is low but the sample size is large. Each chapter begins with a detailed overview, and many applications are given. Matlab code for the estimation techniques is also included. The book will thus serve as an excellent introduction and reference for researchers analysing such signals.

Imme VAN DEN BERG. — **Principles of infinitesimal stochastic and financial analysis.** — Un vol. relié, 16×22,5, de xii, 136 p. — ISBN 981-01-4358-8. — Prix: £21.00. — World Scientific, Singapore, 2000.

The setting of this book is the discrete-time version of the Black-Scholes model, namely the Cox-Ross-Rubinstein model. The book gives a complete description of its background, which is now only the theory of finite stochastic processes. The novelty lies in the fact that orders of magnitude — in the sense of nonstandard analysis — are imposed on the parameters of the model. This not only makes the model more economically sound (such as rapid fluctuations of the market being represented by infinitesimal trading periods), but also leads to a significant simplification: the fundamental results of Black-Scholes theory are derived in full generality and with mathematical rigour, now at graduate level. The material has been repeatedly taught in a third-year course to econometricians.

Analyse numérique

Kai BORRE. — **Plane networks and their applications.** — Un vol. relié, 16×24, de x, 170 p. — ISBN 0-8176-4193-9. — Prix: SFr. 88.00. — Birkhäuser, Boston, 2001.

Key features include: Examination of classical mathematical tools for analyzing discrete networks is followed by a new well-developed theory, which is the continuous analogue of a discrete network. — Transition from the discrete to the continuous case described via finite elements: Ch. 3 involves an analysis of linear operators, variational calculus, boundary value problems for PDEs, and Green's functions; Green's functions are the continuous analogue of the discrete error covariance functions, and form the basis all types of error prediction. — Techniques applied to levelling and other observation types of networks in one and two dimensions. — Three different applications of the continuous theory. — Practical problems, supported by MATLAB files, underscore the continuous theory; additional material can be downloaded from the author's website at www.kom.auc.dk/~borre/network.

P.G. CIARLET, J.L. LIONS, (Editors). — **Handbook of numerical analysis, vol. 7: Solution of equations in \mathbb{R}^n (part 3). Techniques of scientific computing (part 3)**. — Un vol. relié, 17,5×24,5, de x, 1020 p. — ISBN 0-444-50350-1. — Prix: Dfl. 350.00. — Elsevier, Amsterdam, 2000.

This series of volumes covers all the major aspects of Numerical Analysis, serving as the basic reference work on the subject. Each volume concentrates on one to three particular topics. Each article, written by an expert, is an in-depth survey, reflecting the most recent trends in the field, and is essentially self-contained. *Contents*: Gaussian elimination for the solution of linear systems of equations by G. Meurant. — The analysis of multigrid methods by J.H. Bramble and X. Zhang. — Wavelet methods in numerical analysis by A. Cohen. — Finite volume methods by R. Eymard, T. Gallouët and R. Herbin.

Franck JEDRZEJEWSKI. — **Introduction aux méthodes numériques**. — Un vol. broché, 15×23,5, de 269 p. — ISBN 2-287-59711-5. — Prix: DM 79.00. — Springer, Paris, 2001.

L'originalité de ce livre est de réunir en un seul volume l'ensemble des techniques numériques enseignées dans les Grandes Ecoles et certaines formations universitaires. Il présente sur de nombreux exemples le déroulement séquentiel des algorithmes et est, par conséquent, d'une lecture facile. Les concepts premiers du calcul numérique, les notions de stabilité, de convergence et d'optimisation algorithmiques sont introduits dès les premiers chapitres. Les méthodes d'approximation et les techniques d'analyse numérique matricielle, qui forment les chapitres suivants, sont accompagnées d'exemples et d'exercices qui permettent une meilleure compréhension du texte. L'étude des équations différentielles ordinaires introduit plusieurs concepts mathématiques importants. Les derniers chapitres sont consacrés aux équations aux dérivées partielles et aux méthodes d'éléments finis. Ils traitent de la résolution numérique des équations linéaires et non-linéaires de mécanique et de physique mathématique, qui demeurent les problèmes qui préoccupent le plus les ingénieurs d'aujourd'hui.

Alexander A. SAMARSKII. — **The theory of difference schemes**. — Monographs and textbooks in pure and applied mathematics, vol. 240. — Un vol. relié, 16×23,5 de xvii, 761 p. — ISBN 0-8247-0468-1. — Prix: US\$225.00. — Marcel Dekker, New York, 2001.

Illustrated with helpful examples of practical implementations of general stability theory for improving accuracy, the book summarizes basic concepts such as approximation, stability, convergence, and operator equations... demonstrates applications of a priori estimates for establishing convergence and expressing stability of two- and three-layer schemes with initial data... describes homogeneous difference schemes in the class of discontinuous coefficients... covers a variety of elliptic equations, including the Dirichlet problem and Poisson's equations... treats difference schemes as operator and operator-difference equations without structural constraints and as nonstationary equations with constant coefficients... and much more.

Informatique

Gerald FARIN, Dianne HANSFORD. — **The essentials of CAGD**. — Un vol. relié, 19×24,5, de xii, 229 p. — ISBN 1-56881-123-3. — Prix: US\$48.00. — A.K. Peters, Natick, Mass., 2000.

Putting the G into CAGD, the authors provide a much-needed practical and basic introduction to computer-aided geometric design. This book will help readers understand and use the elements of computer-aided geometric design, curves and surfaces, without the mathematical baggage that is necessary only for more advanced work. Though only minimal background in mathematics is needed to understand the book's concepts, the book covers an amazing array of