

# Analyse fonctionnelle

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complex information such as music, speech, images and patterns to be decomposed into elementary forms and subsequently reconstructed with high precision. With an increased demand for mathematical tools to provide theory and applications for science and engineering, the interest in wavelet analysis is intense and pervasive in all disciplines. The major emphasis here is on the logical development of fundamental ideas and the systematic treatment of wavelet analysis and its applications to a wide variety of problems as encountered in various interdisciplinary areas.

Anton DEITMAR. — **A first course in harmonic analysis.** — Universitext. — Un vol. relié, 16×24, de XI, 151 p. — ISBN 0-387-95375-2. — Prix: € 44.95. — Springer, New York, 2002.

In contrast to other books on the topic, this work is entirely based on the Riemann integral and metric spaces instead of the more demanding Lebesgue integral and abstract topology. Nevertheless, almost all proofs are given in full and all central concepts are presented clearly. The first aim of this book is to provide an introduction to Fourier analysis, leading up to the Poisson summation formula. The second aim is to make the reader aware of the fact that both principal incarnations of Fourier theory, the Fourier series and the Fourier transform, are special cases of a more general theory arising in the context of locally compact Abelian groups. The third goal of this book is to introduce the reader to the techniques used in harmonic analysis of noncommutative groups. These techniques are explained in the context of matrix groups as a principal example.

Palle E. T. JORGENSEN. — **Ruelle operators: functions which are harmonic with respect to a transfer operator.** — Memoirs of the American Mathematical Society, no. 720. — Un vol. broché, 18×26, de VIII, 60 p. — ISBN 0-8218-2688-3. — Prix: £28.00. — American Mathematical Society, Providence RI, distributed by Oxford University Press, Oxford, 2001.

*Contents:* Introduction. — A discrete  $ax + b$  group. — Proof of Theorem. — Wavelet filters. — Cocycle equivalence of filter functions. — The transfer operator of Keane. — A representation theorem for  $R$ -harmonic functions. — Signed solutions to  $R(f) = f$ . — Bibliography.

## *Analyse fonctionnelle*

William ARVESON. — **A short course on spectral theory.** — Graduate texts in mathematics, vol. 209. — Un vol. relié, 16×24, de X, 135 p. — ISBN 0-387-95300-0. — Prix: € 49.95. — Springer, New York, 2002.

This book presents the basic tools of modern analysis within the context of the fundamental problem of operator theory: to calculate spectra of specific operators on infinite dimensional spaces, especially operators on Hilbert spaces. The tools are diverse, and they provide the basis for more refined methods that allow one to approach problems that go well beyond the computation of spectra: the mathematical foundations of quantum physics, noncommutative  $K$ -theory, and the classification of simple  $C^*$ -algebras being three areas of current research activity which require mastery of the material presented here.

Ward CHENEY. — **Analysis for applied mathematics.** — Graduate texts in mathematics, vol. 208. — Un vol. relié, 16×24, de VIII, 444 p. — ISBN 0-387-95279-9. — Prix: € 54.95. — Springer, New York, 2001.

The book begins with a gentle introduction to normed linear spaces and Hilbert spaces, taking the reader as far as the Spectral Theorem for compact normal operators on a Hilbert space. Next, the book treats various practical methods for solving problems that arise in applied mathematics, such as differential equations, boundary value problems, and integral equations. To prepare the reader for work in the modern theory of partial differential equations, the subject of distributions is taken up next. A chapter on the Fourier transform and its applications follows,

and includes a section on Sobolev spaces. Another chapter discusses topics that are related to those in the earlier parts of the book but are more specialized, such as separation theorems, selection theorems, Fredholm theory, and linear topological spaces. The final chapter provides a concise account of measure theory and integration.

M.M. RAO, Z.D. REN. — **Applications of Orlicz spaces.** — Pure and applied mathematics, vol. 250. — Un vol. relié,  $15,5 \times 23,5$ , de xi, 464 p. — ISBN 0-8247-0730-3. — Prix: US\$185.00. — M. Dekker, New York, 2002.

Presenting previously unpublished material on the fundamental properties of Orlicz sequence and function spaces, this reference/text examines new perspectives and results from geometric, Fourier, stochastic, nonlinear partial differential equations (PDE), composition operator, and metric function space analysis. Applications of Orlicz spaces provides practical applications in statistics and probability... identifies the geometric properties of Banach spaces... considers the martingale concept for vector and operator functions... explores Beurling-Orlicz algebras... discusses embedding theorems for Orlicz-Sobolev spaces... studies the sample path behavior of stochastic processes... and includes other applications.

Raymond A. RYAN. — **Introduction to tensor products of Banach spaces.** — Springer monographs in mathematics. — Un vol. relié,  $16,5 \times 24$ , de xiv, 225 p. — ISBN 0-387-95335-3. — Prix: € 74.95. — Springer, London, 2002.

This volume provides a self-contained introduction to the theory of tensor products of Banach spaces. The only prerequisites are a basic knowledge of functional analysis and measure theory. Features of particular interest include: A full treatment of the Grothendieck theory of tensor norms. — Coverage of the Chevet-Saphar norms and their duals, along with the associated classes of nuclear, integral and summing operators. — Chapters on the approximation property and the Radon-Nikodým property. — Topics such as the Bochner and Pettis integrals, the principle of local reflexivity and the Grothendieck inequality placed in a natural setting. — The classes of operators generated by a tensor norm and connections with the theory of operator ideals.

Karen SAXE. — **Beginning functional analysis.** — Un vol. relié,  $16 \times 24$ , de xi, 197 p. — ISBN 0-387-95224-1. — Prix: € 44.95. — Springer, New York, 2002.

The unifying approach of functional analysis is to view functions as points in some abstract vector space and the differential and integral operators relating these points as linear transformations on these spaces. The author presents the basics of functional analysis with attention paid to both expository style and technical detail, while getting to interesting results as quickly as possible. The book is accessible to students who have completed first courses in linear algebra and real analysis. Topics are developed in their historical context, with accounts of the past — including biographies — appearing throughout the text. The book offers suggestions and references for further study, and many exercises.

Peter SCHNEIDER. — **Nonarchimedean functional analysis.** — Springer monographs in mathematics. — Un vol. relié,  $17 \times 24$ , de 156 p. — ISBN 3-540-42533-0. — Prix: € 39.95. — Springer, Berlin, 2002.

The present book is a self-contained text which leads the reader through all the important aspects of the theory of locally convex vector spaces over nonarchimedean fields. One can observe an increasing interest in methods from nonarchimedean functional analysis, particularly in number theory and in the representation theory of  $p$ -adic reductive groups. The book gives a concise and clear account of this theory, it carefully lays the foundations and also develops the

more advanced topics. Although the book will be a valuable reference work for experts in the field, it is mainly intended as a streamlined but detailed introduction for researchers and graduate students who wish to apply these methods in different areas.

Akihito UCHIYAMA. — **Hardy spaces on the Euclidean space.** — Springer monographs in mathematics. — Un vol. relié,  $17 \times 24$ , de XIII, 305 p. — ISBN 4-431-70319-5. — Prix: € 79.95. — Springer, Berlin, 2001.

Prof. Peter W. Jones says in his special contribution to this book that Uchiyama's decomposition of BMO functions is considered the Mount Everest of Hardy space theory. This book is based on the draft, which the author Akihito Uchiyama had completed by 1990. It deals with the theory of real Hardy spaces on the  $n$ -dimensional Euclidean space. Here the author explains scrupulously some important results on Hardy spaces by real-variable methods, in particular, the atomic decomposition of elements in Hardy spaces and the author's constructive proof of the Fefferman-Stein decomposition of BMO functions into the sum of a bounded function and Riesz transforms of bounded functions.

### ***Théorie des opérateurs***

Alexander A. BORICHEV, Nikolai K. NIKOLSKI, (Editors). — **Systems, approximation, singular integral operators, and related topics.** — International Workshop on Operator Theory and Applications, IWOTA 2000. — Operator theory: advances and applications, vol. 129. — Un vol. relié,  $18 \times 24$ , de XVIII, 527 p. — ISBN 3-7643-6645-1. — Prix: SFr. 228.00. — Birkhäuser, Basel, 2001.

This book is devoted to some topical problems and applications of operator theory and its interplay with modern complex analysis. It consists of 20 selected survey papers that represent updated (mainly plenary) addresses to the IWOTA 2000 Conference held at Bordeaux from June 13 to 16, 2000. The main subjects of the volume include: Spectral analysis of periodic differential operators and delay equations, stabilizing controllers, Fourier multipliers. — Multivariable operator theory, model theory, commutant lifting theorems, coisometric realizations. — Hankel operators and forms. — Operator algebras. — The Bellman function approach in singular integrals and harmonic analysis, singular integral operators and integral representations. — Approximation in holomorphic spaces. These subjects are unified by the common "operator theoretic approach" and the systematic use of modern function theory techniques.

Israel GOHBERG, Heinz LANGER, (Editors). — **Linear operators and matrices: the Peter Lancaster anniversary volume.** — Operator theory: advances and applications, vol. 130. — Un vol. relié,  $17 \times 23,5$ , de VI, 281 p. — ISBN 3-7643-6655-9. — Prix: SFr. 201.50. — Birkhäuser, Basel, 2002.

This volume is dedicated to Peter Lancaster, an outstanding expert in operator and matrix theory, numerical analysis and applications, on the occasion of his seventieth birthday. The book contains a selection of recent original research papers in linear algebra and analysis, areas in which Peter Lancaster was very active. The articles are complemented by biographical data and a list of publications.

László KÉRCHY, Ciprian FOIAS, Israel GOHBERG, Heinz LANGER, (Editors). — **Recent advances in operator theory and related topics: the Béla Szőkefalvi-Nagy memorial volume.** — Operator theory: advances and applications, vol. 127. — Un vol. relié,  $18 \times 24$ , de XLIX, 669 p. — ISBN 3-7643-6607-9. — Prix: SFr. 248.00. — Birkhäuser, Basel, 2001.

In August 1999, an international conference was held in Szeged, Hungary, in honor of Béla Szőkefalvi-Nagy, one of the founders and main contributors of modern operator theory. This