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Kapitel: Analyse de Fourier, analyse harmonique abstraite

Équations aux différences finies, équations fonctionnelles

V. LAKSHMIKANTHAM, Donato TRIGIANTE. — **Theory of difference equations: numerical methods and applications.** — Second edition. — Pure and applied mathematics, vol. 251. — Un vol. relié, 26×18, de v, 300 p. — ISBN 0-8247-0803-2. — Prix: US$150.00. — Marcel Dekker, New York, 2002.

This text provides a clear and comprehensive overview of the fundamental theories, numerical methods, and iterative processes encountered in difference calculus and explores classical problems such as orthogonal polynomials, the Euclidean algorithm, roots of polynomials, and well-conditioning — presenting practical applications in fields such as economics, chemistry, population dynamics, and queueing theory. Containing numerous end-of-chapter examples and solved equations to highlight key mathematical concepts, this book demonstrates the versatility of difference equations with numerous models and real-world examples... offers a unified treatment of stability theory using Liapunov functions and comparison techniques... examines the relationships between difference equations and linear algebra, number theory, and population dynamics...summarizes useful methods to solve difference equations with constant coefficients... stresses the importance of difference equations in numerical analysis and combinatorics... discusses the Pascal matrix and its properties... and analyzes the Gaussian arithmetic-geometric mean.

Approximations et développements en série

Q.I. RAHMAN, G. SCHMEISSER. — **Analytic theory of polynomials.** — London Mathematical Society monographs. New series, vol. 26. — Un vol. relié, 16,5×24, de XIV, 742 p. — ISBN 0-19-853493-0. — Prix: €90.00. — Clarendon Press, Oxford, 2002.

This book presents easy to understand proofs of some of the most difficult results about polynomials demonstrated by means of applications. Readership: Professional and academic mathematicians of complex analysis, approximation theory and theoretical numerical analysis, graduate students in mathematics, engineers, statisticians and theoretical physicists. — *Contents:* Introduction. — Part 1, Critical points in terms of zeros: Fundamental results on critical points. More sophisticated methods. More specific results on critical points. Applications to compositions of polynomials. Polynomials with real zeros. Conjectures and solutions. — Part 2, Zeros in terms of coefficients: Inclusion of all zeros. Inclusion of some of the zeros. Number of zeros in an interval. Number of zeros in a domain. — Part 3, Extremal properties: Growth estimates. Mean values. Derivative estimates on the unit disc. Derivative estimates on the unit interval. Coefficient estimates.

Analyse de Fourier, analyse harmonique abstraite

Agostino ABBATE, Casimer M. DECUSATIS, Pankaj K. DAS. — **Wavelets and subbands: fundamentals and applications.** — Applied and numerical harmonic analysis. — Un vol. relié, 16×24, de XIV, 551 p. — ISBN 0-8176-4136-X (Boston), 3-7643-4136-X (Basel). — Prix: SFr. 158.00. — Birkhäuser, Boston, 2002.

The book is designed to present an understanding of wavelets and their development from a continuous-domain transformation to a frame representation and finally to multiresolution analysis tools such as subband decomposition. — *Topics and features:* provides an understanding of the link between the continuous wavelet transform, the fast wavelet transform, and subband

decomposition; algorithms and numerical examples implemented in MATLAB®; discusses the design of wavelet bases and details how to implement the transform both in hardware and software; covers the fundamentals and the developments of the links between areas such as time-frequency analysis, digital signal processing, image processing, and Fourier and wavelet transforms, both continuous and discrete; offers extended mathematical treatment and numerous examples, with particular emphasis on the transition from the continuous domain to multiresolution and subband.

Peter BORWEIN. — **Computational excursions in analysis and number theory**. — CMS books in mathematics. — Un vol. relié, 16×24, de x, 220 p. — ISBN 0-387-95444-9. — Prix: €69.95. — Springer, New York, 2002.

This book is designed for a computationally intensive graduate course based around a collection of classical unsolved extremal problems for polynomials. These problems, all of which lend themselves to extensive computational exploration, live at the interface of analysis, combinatorics, and number theory, so the techniques involved are diverse. A main computational tool used is the LLL algorithm for finding small vectors in a lattice. Many exercises and open research problems are included. Indeed, one aim of the book is to tempt the able reader into the rich possibilities for research in this area.

Analyse fonctionnelle

Boris BUFFONI, John TOLAND. — **Introduction à la théorie globale des bifurcations.** — Cahiers mathématiques de l'Ecole polytechnique fédérale de Lausanne. — Un vol. broché, 15×21, de x, 130 p. — ISBN 2-88074-494-6. — Prix: SFr. 49.50. — Presses polytechniques et universitaires romandes, Lausanne, 2002.

L'ouvrage expose et justifie le *principe de linéarisation,* à savoir que les petites solutions d'une équation différentielle sont bien décrites par les fonctions propres du problème linéarisé. Le cadre abstrait est celui du calcul différentiel dans les espaces de Banach et le résultat principal et le fameux théorème de bifurcation de Crandall-Rabinowitz. Il présente ensuite, dans le langage des analystes, la théorie des germes d'ensembles analytiques, qui a pour objet la structure locale des solutions d'un système d'équations analytiques de plusieurs variables. Grâce à cette structure, le principe de linéarisation peut être étendu aux solutions de grande taille et fournir un théorème global de bifurcation plus précis que celui obtenu par des arguments topologiques.

Michael CWIKEL, Miroslaw ENGLIŠ, Alois KUFNER, Lars-Erik PERSSON, Gunnar SPARR, (Editors). — **Function spaces, interpolation theory and related topics.** — Proceedings of the International Conference in honour of Jaak Peetre on his 65th birthday, Lund, Sweden, August 17-22, 2000. — Un vol. relié, 18×24,5, de x, 462 p. — ISBN 3-11-017117-1. — Prix: €128.97. — Walter de Gruyter, Berlin, 2002.

Jaak Peetre is one of the founders of the theory of interpolation spaces and a brilliant contributor to several other areas of mathematics. The articles cover a wide range of topics both from interpolation theory and from other fields where Jaak Peetre's ideas and results have left an indelible mark: the theory of function spaces; Hankel-type and related operators; analysis on bounded symmetric domains; PDEs; and special functions. The book opens with biographical material and a list of Peetre's publications, followed by his paper on the history of the "birth" of the theory of interpolation, and by a paper of the late co-founder of this theory, Jacques-Louis Lions, on reproducing kernels.