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BOOK REVIEWS *RECENZII*

B.D. BOJANOV, H.A. HAKOPIAN and A.A. SAHAKIAN - *Spline Functions and Multivariate Interpolations*, Mathematics and Its Applications, vol. 248, Kluwer Academic Publishers, Dordrecht, Boston, London, 1993, 276 p., ISBN 0-7923-2229-0.

Cartea este o introducere cuprinzătoare în teoria funcţiilor spline de una sau mai multe variabile. Sunt incluse noi dezvoltări mai ales în domeniul interpolării Birkhoff, al proprietăţilor extremale ale funcţiilor spline şi la interpolarea multidimensională. Cele treisprezece capitole ale cărţii sunt dedicate următoarelor direcţii: interpolarea polinomială, spaţiul funcţiilor spline, funcţii B-spline, interpolarea prin funcţii spline, funcţii spline naturale, funcţii spline perfecte, funcţii monospline, funcţii spline periodice, funcţii B-spline multidimensionale, diferenţe divizate de mai multe variabile, funcţii box-spline, interpolarea multidimensională. O parte din rezultate sunt prezentate fără demonstraţii ca exerciţii, având însă indicaţii de rezolvare. Cartea este adresată studenţilor şi cercetătorilor interesaţi în analiza numerică, în special în teoria aproximării.

C. Ilioi

DING-ZHU DU and JIE SUN (editors) - *Advances in Optimization and Approximation*, Nonconvex Optimization and Its Applications, vol. 1, Kluwer Academic Publishers, Dordrecht, Boston, London, 1994, 389 p., ISBN 0-7923-2785-3.

Volumul este o colecţie de lucrări recente din domeniul optimizării şi aproximării dedicate profesorului Minyi Yue de la Institutul de Matematici Aplicate de la Beijing, China. Lucrările acoperă o arie foarte largă de preocupări din optimizarea geometrică, algoritmi de proiecţie a gradientului, din programarea liniară finită şi semi-infinită, de asemenea unele aplicaţii din biologia moleculară. Accentul este pus pe aspectele algoritmice din optimizare, pe algoritmi de aproximare în problemele de optimizare globală şi pe diferite probleme practice. Sunt cuprinse de asemenea lucrări de informatică teoretică. Cartea se adresează cercetătorilor din analiza numerică, teoria aproximării, optimizare şi modelare matematică.

C. Ilioi

SUSANA GOMEZ and JEAN-PIERRE HENNART (Editors) - *Advances in Optimization and Numerical Analysis,* Mathematics and Its Applications, vol. 275, Kluwer Academic Publishers, Dordrecht, Boston, London, 1994, 286 p., ISBN 0-7923-2673-3.

Volumul este consacrat lucrărilor celui de al şaselea Colocviu de Optimizare şi Analiză Numerică ţinut la Oaxaca din Mexico în ianuarie 1992, în organizarea Departamentului de Analiză Numerică al Universităţii Naţionale din Mexico, în colaborare cu Departamentul de Ştiinţe Matematice de la Univerrsitatea Rice. Cele optsprezece lucrări cuprinse în carte se referă, în principal, la: optimizarea continuă, metode de punct interior şi de tip simplex în programarea liniară, noi metode în programarea neliniară, rezultate privind probleme de complementaritate liniară ne-convexă, probleme de optimizare nediferenţiabilă. Câteva lucrări privind studiul metodelor numerice pentru ecuaţii diferenţiale de difuzie şi advecţie sunt de asemenea cuprinse în volum. Volumul este adresat cercetătorilor interesaţi în optimizare, ecuaţii cu derivate parţiale şi modelare.

C. Ilioi

ANDRÁS PRÉKOPA, *Stochastic Programming,*Kluwer Academic Publishers, Dordrecht, Boston, London, 1995, 599 p., ISBN 0-7923-3482-5 (Kluwer), ISBN 963-05-6872-1 (Akadémiai Kiadó).

Cartea pe care o prezentăm acoperă cea mai mare parte din programarea stochastică şi este formată din 15 capitole şi o bibliografie conţinând 538 titluri. În primele 3 capitole sunt prezentate succint principalele rezultate din programarea liniară deterministă, deosebit de utile în programarea stochastică. În capitolul 4 sunt prezentate măsurile probabiliste logconcave şi generalizări ale lor. Aceste măsuri sunt folosite pentru stabilirea convexităţii unor probleme de programare stochastică, în special a problemelor cu restricţii probabiliste. Capitolul 5 conţine fundamentele problemelor de optimizare de tip momente, folosite în construcţia modelelor de programare stochastică. O mare parte din acest capitol este dedicată problemei discrete a momentelor care permite analiza problemei mărginirii probabilităţilor. În capitolul 6 se acordă o atenţie sporită acestor proceduri de mărginire şi se prezintă scheme probabiliste de aproximare, combinând integrarea numerică cu simularea. În capitolul 7 sunt prezentate într-un cadru istoric, principiile teoretice ale deciziilor statistice, arătându-se cum au luat naştere modelele de programare stochastică. În capitolul 8 sunt prezentate în rezumat unele modele statice de programare stochastică. În capitolul 9 sunt detaliate două tehnici de rezolvare a problemei de programare stochastică în două etape, pentru cazul variabilelor aleatoare discrete. Se folosesc aşa numitele δ- şi λ-reprezentările unei funcţii liniare pe porţiuni. Se menţionează şi modul de abordare în cazul variabilelor aleatoare de tip continuu. În capitolul 10 sunt prezentate teoremele privind convexitatea problemelor de programare stochastică cu restricţii probabiliste. Capitolul 11 este consacrat programării cu restricţii probabiliste şi problemei metodologice a maximizării unei probabilităţi cu restricţii. În capitolul 12 este descris modelul în două etape în condiţii de incertitudine. În capitolul 13 sunt discutate problemele de programare stochastică în mai multe etape. În capitolul 14 este dată o selecţie a unor probleme aplicative speciale, printre care amintim problemele de tip reţea. In final, capitolul 15 este dedicat problemelor de distribuţie în programarea stochastică. Această problematică este în curs de dezvoltare şi subliniem în special analiza problemelor de optimizare combinatorială. Cu excepţia capitolelor 7, 13 şi 14, toate capitolele sunt completate cu secţiuni de exerciţii şi probleme.

C. Amihăesei

M.J. VAN DER LAAN - *Efficient and Inefficient Estimation in Semiparametric Models;* Centrum voor Wiskunde en Informatica 114, CWI TRACT, 1995, ISBN 906196 461 X.

Lucrarea pe care o recenzăm este formată dintr-un capitol introductiv şi două părţi cu titlurile: *Basic Theory;* Part I: *Efficiency Theory and Applications for (Nonparametric) Maximum Likelihood Estimators;* Part II: *Inefficient Estimation in Semiparametric Models.* În capitolul introductiv sunt prezentate rezultatele necesare dezvoltării celor două părţi, din teoria convergenţei slabe, teoria proceselor empirice, teoria eficienţei şi sunt prezentate câteva tehnici multidimensionale. Prima parte, formată din cinci capitole, acoperă teoria generală a eficienţei estimatorilor de verosimilitate maximă (MLE) şi se încheie cu aplicarea acestei teorii la studiul unei clase generale de modele cu date incomplete şi cu prezentarea a două aplicaţii interesante. Sunt cercetate în special unele modele convexe, stabilindu-se o identitate aplicabilă şi în cazul unor modele modificate ale MLE. Partea întâi foloseşte din capitolul introductiv teoria proceselor empirice şi teoria eficienţei. În partea a doua a acestui tratat se cercetează construcţia estimatorilor ineficienţi în modele bidimensionale, considerând estimatorii ca funcţionale de funcţia empirică şi stabilind diferenţiabilitatea acestor funcţionale. Aceşti estimatori sunt importanţi deoarece sunt uşor de calculat, sunt performanţi din punct de vedere practic şi sunt foarte robuşti în raport cu modificarea distribuţiei. Lucrarea conţine o bibliografie cu peste 90 titluri de lucrări şi monografii şi sunt făcute comentarii utile privind abordarea diverselor teme.

C. Amihăcesei

PARDALOS M. PANOS, SISKOS YANNIS, ZOPOUNIDIS CONSTANTIN (editors): *Advances in multicriteria analysis*, Kluwer Academic Publishers, Dordrecht, Boston, London, 1995, XXV+247 p, ISBN 0-7923-3671-2.

This book contains 15 papers about multicriteria analysis, which are divided into five sections: Methodology, Problem structuring, Utility assessment, Multiobjective optimization, and Real world applications. In the first section, Ph. Vincke proposes a list of properties that should be respected by a method used in order to rank the alternatives of a multicriteria decision problem. D. Bouyssou studies the problem of choosing based on the fuzzy preference relations and V. Mousseau deals with the problem of relative importance of criteria. In the second section, O.I. Larichev and H.M. Moskovich study a class of unstructured decision making problems and V. Korotkich studies the role of a structural complexity as a tool for the criteria definition and study of optimal problem solving. In the Utility assessment section, C.A. Bana e Costa and J.-C. Vansnick describe an interactive approach for cardinal measurement of judgements about the degrees to which the elements of a set A possess a given property, D.K. Despotis and C. Zopounidis use an ordinal regresion model in order to estimates an additive utility function for a problem of multiattribute choise in the presence of non-monotonic preferences. In the following section, M. Zeleny purposes a procedure, named the Ideal Degradation Procedure, which is designed to solve multicriteria problems without scalarization, A. Jaszkievicz and R. Slowinski describe an interactive procedure for multiple objective

analysis of linear and non-linear programs, H. Nakayama presents theoretical foundations and some applications of the satisficing trade-off method developed by the author, and A. Migdalas derives conditions under which a bi-level problem can be replaced by a bi-criteria problem. In the last section, Y. Siskos, E. Grigoroudis, N.F. Matsatsinis and G. Baourakis study the consumer behavior in a market of agricultural products following a preference disaggregation analysis, E. Jacquet-Lagrèze presents an application of a disaggregation method in order to evaluate research and development projects, J.P. Costa and J.N. Climaco purpose a multiobjective linear programming approach to the financial plans over a planning period and H.P. Benson presents a linear multiple objective integer programming model for scheduling surgeries which require post-operative intensive care.

C. Smadici

DING-ZHU DU and PANOS M. PARDALOS: *Minimax and Applications*, Kluwer Academic Publishers, Dordrecht, Boston, London, 1995, XIV+292 p, ISBN 0-7923-3615-1.

This book is a collection of papers which cover various topics and provide a good picture of recent research in classical minimax theory most papers being concerned with optimality and approximate algorithms of minimax combinatorial optimization problems. The book contains the following papers: *Minimax Theorems and Their Proofs* (Stephen Simons), *A survey on Minimax Trees and Associated Algorithms* (Claude G. Diderich and Marc Gengler), *An Iterative Method for the Minimax Problem* (Liqun Qi and Wenyu Sun), *A Dual and Interior Point Approach to Solve Convex Min-Max Problems* (Jos F. Sturm and Shuzhong Zhang), *Determining the Performance Ratio of Algorithm MULTIFIT for Scheduling* (Feng Cao), *A Study of On-Line Scheduling Two-Stage Shops* (Bo Chen and Gerhard J. Woeginger), *Maximin Formulation of the Apportionments of Seats to a Parliament* (Thorkell Helgason, Kurt Jörnsten and Athanasios Migdalas), *On Shortest k-Edge Connected Steiner Networks with Rectilinear Distance* (D. Frank Hsu, Xiao-Dong Hu and Yoji Kajitani), *Mutually Repellant Sampling* (Shang-Hua Teng), *Geometry and Local Optimality Conditions for Bilevel Programs with Quadratic Strictly Convex Lower Levels* (Luis N. Vicente and Paul H.Calamai), *The Spherical One-Center Problem* (Guoliang Xue and Shangzhi Sun), *On Min-Max Optimization of a Collection of Classical Discrete Optimization Problems* (Gang Yu and Panagiotis Kouvelis), *Heilbronn Problem for Six Points in a Planar Convex Body* (Andreas W.M. Dress, Lu Yang and Zhenbing Zeng), *Heilbronn Problem for Seven Points in a Planar Convex Body* (Lu Yang and Zhenbing Zeng), *On the Complexity of Min-Max Optimization Problems and Their Approximation* (Ker-I Ko and Chih-Long Lin), *A Competitive Algorithm for the Counterfeit Coin Problem* (Xiao-Dong Hu and Frank K. Hwang), *A Minimax $\alpha\beta$ Relaxation for Global Optimization* (Jun Gu), *Minimax Problems in Combinatorial Optimization* (Feng Cao, Ding-Zhu Du, Biao Gao, P.M. Pardalos and Peng-Jun Wan).

C. Smadici

KOOLE G.M., *Stochastic scheduling and dynamic programming,* CWI TRACT 113, Stichting Mathematich Centrum, Amsterdam, 1995, 131 p, ISBN 90 6196 457 1.

This monograph is a revision of author's PhD thesis based on his studies on various scheduling problems for which optimal policies can be characterized by using dynamic programming techniques. The models studied refer to stochastic scheduling problems based on Markov type arrival processes and exponential service times with one or more servers. The models are divided in two classes named customer assignment models and server assignment models, the former class containing the models in which each arriving customer is to be assigned to one of the servers (queues) and the latter containing those models in which the servers are to be assigned to different customer classes (queues). The results which refer to optimal policies are obtained by using an appropriate discrete-time dynamic programming equation giving the expected cost over $n+1$ jumps, starting in a given state, as a function of expected costs over n jumps and the parameters of the model.

C. Smadici

CHARLES A. STUART, *Bifurcation into Spectral Gaps,* Société Mathématique de Belgique, 1995, 59 p. (Supliment la Bulletin of the Belgian Mathematical Society Simon Stevin), ISSN 1370-1444.

Aceste note prezintă o tratare unitară şi câteva rafinări ale unor lucrări recente, parţial datorate autorului, privind existenţa şi bifurcarea soluţiilor unor ecuaţii abstracte de forma

$$Su - R(u) = \lambda u,\ \lambda \in I\!R,\ u \in D(S) \cap D(R)$$

pe spaţii Hilbert reale; S este un operator liniar, autoadjunct, nemărginit, cu domeniul $D(S)$ iar R este un operator potenţial neliniar, cu domeniul $D(R)$. Se poate presupune că $0 \notin \sigma(S)$ şi se foloseşte descompunerea spaţiului Hilbert după părţile negativă şi pozitivă ale operatorului S, combinată cu metode variaţionale.

Lucrarea conţine de asemenea aplicaţii la ecuaţii diferenţiale.

Şt. Frunză

R.N. ROLL, *Loop checking in logic programming;* CWI TRACT, 112, Centrum voor Wiskunde en Informatika, Amsterdam, 1995, 198 p., ISBN 906196 456 3.

This book is a revised version of the author's PhD. Thesis and it is fundamental in the field of logic programming theory. If one wants that a practical implementation to be a good approximation of a logic programming language, than loop checking must be taken into account. But what is a good loop checking procedure? This book provide rigurous conditions that a loop checker must fulfill in order to be integrated in a logic programming language. The notions of *sl sound* and *weakly sound* loop checking procedures are defined and then carefully analized. Applications of the loop checks are presented. They include approximations for *non-monotonic reasoning* and *partial evaluation.* Then more specific loop checks are defined: *equality checks, subsumption checks* and *context checks.* Completness of loop check for positive (definite) logic programs is studied for the classes of loop checkers defined in the book. The loop check is then extended to logic programs with default negation. This book has already became a classic and I must emphasize that it is indispensable for those who investigate (either theoretical or practical) techniques of implementation for logic programming languages or non-monotonic logics.

Cristian Papp

S.A. SMULDERS – *Control of freeway traffic flow,* CWI TRACTS, 80, Centrum voor Wiskunde en Informatika, Amsterdam, 1996, 158 p., ISBN 906196 451 2.

The traffic problem considered in this book is concerned with traffic flow on freeways. After presenting Van Maarseveen's model and extending it to account for the speed measurements, the model is evaluated for some basic traffic situations by means of stochastic simulation. The measurement data are analysed to obtain estimates of several model parameters. The model is used as a basis for an approximate filter, which is tested against simulated as well as real traffic data. Finally, the problem of controlling the variable message signs of the motorway control system is addressed. The last chapter (7) gives a summary of the results and suggestions for further research.

V. Grădinaru

JOHN COATES and S.T. YAN (editors) - *Elliptic Curves, Modular Forms, Fermat's Last Theorem,* International Press, Boston 1995, ISBN 1-57146-026-8.

This volume contains some of the lectures given at the Conference on elliptic curves and modular forms, December 18-21. 1993, Hong Kong, along with some recent articles, related to this topic. Andrew Wiles' deep work on the conjecture that every elliptic curve over Q is modular, with its famous and important consequence - a proof of Fermat's last theorem, was a motivating theme for the conference. The volume includes: a paper on the Galois cohomology of the symmetric square of a modular elliptic curve (J. Coates, A. Sydenham), a work on the refined conjecture of Serre (F. Diamond), a proof of "Wiles minus epsilon implies Fermat" (the remarkable fact that every semistable elliptic curve over Q is modular was not proven yet at the time) by F. Diamond; a detailed presentation of some conjectures on the p-adic representations of the Galois group of a number field (J.M. Fontaine, B. Mazur); an article on elliptic curves of genus 2 with elliptic differentials (G. Frey); a commutative algebra paper on complete intersections and Gorenstein rings (H.W. Lenstra jr.), a work on the homology of the modular affine curves (L. Merel); an invetigation on the component groups of Méron models of Jacobians of modular curves (K. Ribet); an explicit construction of the family of elliptic curves over Q having the same mod p ($p = 3$ or 5) representation as a given curve E (K. Rubin, A. Silverberg); a review of non-archimedean elliptic functions (J. Tate); an investigation of the λ-adic representations of Gal $(\bar{K}/K)$ (K a totally real field) attached to a cuspidal automorphic representation π of $GL_2(A_k)$ for which π_∞ is regular elliptic (Richard Taylor).

A.C. Wolf

M. MATZEU, A. VIGNOLI, *Topological Nonlinear Analysis: Degree, Singularity, and Variations,* Birkhäuser Verlag AG, Basel. Berlin. Boston, 1994, 544 p., ISBN 3-7643-3742-7.

The main purpose of the present volume is to give a survey of some of the most significant achievements obtained by topological methods in Nonlinear Analysis during the last three decades. The survey articles presented here concern the three main branches of research in this field, which are topological degree, singularity theory, and variational methods. They reflect the personal taste of the authors, all of them well-known and distinguished specialists. A common feature of these papers is to start with an historical introduction and climb up to the heights of the most recent results. This gives a very dynamic picture of the state of affairs on these topics. The material of the book presented in part by the authors at the "Topological Analysis Workshop on Degree, Singularity, and Variations" held in May 1993 at Villa Campitelli, Frascati, near Rome.

E. DI BENEDETTO, *Partial Differential Equation,* Birkhäuser Verlag Basel. Berlin. Boston, 1995, 428 p., ISBN 3-7643-3708-7.

This book is a self-contained elementary introduction to Partial Differential Equations. It assumes only advanced differential calculus and some L^p theory. Taking some basic physical models as a starting point, the author uses an approach of classical analysis and a non-linear point of view, to introduce the basic aspects of the theory and provide a background for some current research directions. Table of contents: Preliminaries; Quasilinear Equations and the Cauchy-Kowalewski Theorem; The Laplace Equation; The Double Layer Potential and Boundary Value Problems; Integral Equations and Eigenvalue Problems; The Heat Equation, the Wave Equation; Equations of First Order and Conservation Laws; Bibliography.

J. LINDENSTRAUSS, V.D. MILMAN (Eds). *Geometric Aspects of Functional Analysis,* Israel Seminar GAFA 1992-94, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 348 p., ISBN 3-7643-5207-8.

This volume contains a collection of original research papers on recent developments in Banach space theory and related areas by many of the leading research workers in the field. A considerable number of papers are devoted to structure theory of infinite-dimensional Banach spaces.

This research ground has experienced a remarkable breakthrough in recent years, which has given new insight into infinite-dimensional geometry (even of Hilbert spaces). Several new results and examples and research are included in this volume and new research directions are surveyed. Other contributions concern the well established local theory of Banach spaces and its fruitful connection with classical convexity in R^n. The volume also contains several papers on harmonic analysis, probabilistic methods in functional analysis and nonlinear geometry. Research workers and graduate students in Banach space theory, convexity, harmonic analysis and probability will value this book's utility and insight.

A.M. KYTMANOV , *The Bochner–Martinelli Integral and Its Applications,* Translated from the Russian by M.Martin, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 305 p.,ISBN 3-7643-5240-X.

This is the first monograph devoted entirely to the Bochner–Martinelli integral representation for holomorphic functions in several complex variables. Considered are boundary values of the Bochner–Martinelli integral, the behaviour of the singular integral, jump theorems of the Bochner–Martinelli integral and its derivatives. These methods are applied to the construction of analytic representations of CR-functions and the harmonic representation of distributions, the removal of singularities of CR-functions, the]-Neumann problem, and for proving the multidimensional logarithmic residue formula, the Poincaré-Bertrand formula and others. The book is intended for post-graduate students and specialists in complex analysis and its applications.

I. GOHBERG, H. LANGER (Eds), *Operator Theory and Boundary Eigenvalue Problems,* OT 80, International Workshop in Vienna, July 27-30, 1993. Birkhäuser Verlag Basel. Berlin. Boston, 1995, 328 p. ISBN 3-7643-5275-2.

The Workshop on Operator Theory and Boundary Eigenvalue Problems was held at the Technical University, Vienna, Austria, July 27 to 30, 1993. It was the seventh workshop in the series of IWOTA (International Workshops on Operator Theory and Applications). The main topics at the workshop were interpolation problems and analytic matrix functions, operator theory in spaces with indefinite scalar products, boundary value problems for differential and functional-differential equations and systems theory and control. The workshop covered different aspects, starting with

abstract operator theory up to concrete applications. The papers in these proceedings present an accurate cross section of the lectures presented at the workshop. This book will be of interest to a wide group of pure and applied mathematicians.

J. ZABCZYK, *Mathematical Control Theory. An Introduction.* Systems and Control: Foundations and Aplications. Birkhäuser Verlag Basel. Berlin. Boston, 1992, 260 p.,ISBN 3-7643-3645-5.

Mathematical control theory is a separate branch of mathematics, which, over a span of 150 years, has developed an extensive literature covering its various concepts, constructions and applications. Until now a self-contained treatment of the following areas has been unavailable: the basic theory of finite dimensional linear systems, of nonlinear systems optimal control and infinite dimensional linear systems. *Mathematical Control Theory: An Introduction* presents, in a mathematically precise manner, a unified introduction to deterministic control theory. The presentation requires only a knowledge of basic facts from linear algebra, differential equations and calculus. The author includes the stabilization of nonlinear systems using topological methods, realization theory for nonlinear systems, impulsive control and positive systems, the control of rigid bodies, the stabilization of infinite dimensional systems and the solution of minimum energy problems. The book will be ideal for a beginning graduate course in mathematical control theory or for self study by professionals needing a complete picture of the mathematical theory that underlies the applications of control theory.

I. LASIECKA, B. MORTON, *Control Problems in Industry,* Progress in Systems and Control Theory, PSCT vol. 21, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 364 p., ISBN 3-7643-3813-X.

This volume contains articles presented at the SIAM Symposium on Control Problems in Industry, held from July 22-23, 1994 in San Diego. At this symposium, experts from both academia and industry were brought together to share their experiences and present new results and new trends in modern control theory, with a focus on real industrial applications. The purpose of this volume is to provide a survey of control theory applications at the frontiers of today's technology. The articles were selected primarily for the practical significance of the problem solved, though all had significant mathematical components. Indeed, control theory is an interdisciplinary field which encompasses contributions ranging from classical engineering disciplines (such as automata theory, circuit theory, electronics, mechanical engineering and material science) to theoretical engineering (i.e. system theory, computer science) as well as various areas of mathematics (including ODE's, PDE's, function theory, algebraic and differential geometry). At present there is a wealth of control theoretic results, including new models, new constructions, and new algorithms, leading to new and implementable solutions to industrial problems. The aim of the papers is to present these new results in modern control theory with a focus on practical problems where control theory really can make a difference. This volume will be of interest to researchers and graduate students, as it provides state-of-the-art solutions to practical problems arising in various industries.

J.J. DUISTERMAAT, *Fourier Integral Operators,* Progress in Mathematics, PM 130, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 160 p., ISBN 3-7643-3821-0.

This volume is a useful introduction to the subject of Fourier integral operators and is based on the author's classic set of notes. Covering a range of topics from Hörmander's exposition of the theory, Duistermaat approaches the subject from symplectic geometry and includes applications to hyperbolic quations (= equations of wave type) and oscillatory asymptotic solutions which may have caustics. The text is suitable for mathematicians and (theoretical) physicists with an interest in (linear) partial differential equations, especially in wave propagation, and specifically WKB-methods. Familiarity with analysis (distributions and Fourier transformation) and differential geometry is useful. This book is designed, additionally, for a one-semester introductory course on Fourier integral operators aimed at a broad audience.

S.D. CHATTERJI (Ed), *Proceedings of the International Congress of Mathematicians (ICM), Zürich 1994,* 2 vols-set, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 1676 p.,ISBN 3-7643-5153-5.

Since the first ICM was held in Zürich in 1897, it has become the pinnacle of mathematical gatherings. It aims at giving an overview of the current state of different branches of mathematics and its aplications as well as an insight into the treatment of special problems of exceptional importance. The proceedings of the ICMs have provided a rich chronology of mathematical development in all its branches and a unique documentation of contemporary research. They form an indispensable part of every mathematical

library. The *Proceedings of the International Congress of Mathematicians 1994,* held in Zürich from August 3rd to 11th, 1994, are published in two volumes. Volume I contains an account of the organization of the Congress, the list of ordinary members, the reports on the work of the Fields Medalists and the Nevanlinna Prize Winner, the plenary one-hour addresses, and the invited addresses presented at Section Meetings 1-6. Volume II contains the invited address for Section Meetings 7-19. A complete author index is included in both volumes.

Invited One-Hours Plenary Addresses: Jean Borgain: *Harmonic analysis and nonlinear partial differential equations,* John H. Conway: *Sphere packings, lattices, codes, and greed;* Ingrid Daubechies; *Wavelets and other phase space localization methods;* Jürg Fröhlich: *The fractional quantum Hall effect, Chern-Simons theory, and integral lattices;* Joseph B. Keller: *Wave propagation;* Maxim Kontsevich: *Homological algebra of mirror symmetry;* Pierre-Louis Lions: *On some recent methods for nonlinear partial differential equations;* Marina Ratner: *Interactions between ergodic theory, Lie groups and number theory;* Paul Seymour: *Progress on the four-colour theorem;* S.R.S. Varadhan: *Entropy methods in hydrodynamic scaling;* Victor A. Vassiliev: *Topology of discriminants and their complements;* Dan Voiculescu: *Free probability theory: Random matrices and von Neumann algebras;* Andrew Wiles: *Modular forms, elliptic curves and Fermat's Last Theorem;* Jean-Christophe Yoccoz: *Recent developments in dynamics.*

S. GINDIKIN, J. LEPOWSKY, R. WILSON, *Functional Analysis on the Eve on the 21st Century,* Progress in Mathematics PM 131+132, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 750 p., ISBN 3-7643-3860-1.

These two volumes contain eighteen invited papers by distinguished mathematicians in honor of the eightieth birthday of Israel M. Gelfand, one of the most remarkable mathematicians of our time. Gelfand has played a crucial role in the development of functional analysis during the last half-century. His work and his philosophy have in fact helped shape our understanding of the term "functional analysis". The papers in these volumes largely concern areas in which Gelfand has a very strong interest today, including geometric quantum field theory, representation theory, combinatorial structures underlying various "continuous" constructions, quantum groups and geometry. The second of the two volumes contains the somewhat more "geometric" papers, although such a designation is to a certain extent arbitrary, because of the breadth of the papers.

Vol. I: Contributors: K. Aomoto, R. Brylinksi and B. Kostant, I.B.

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A.B. ANTONEVICH, *Linear Functional Equations. Operator Approach,* Operator Theory, OT 83: Advances and Applications, Birkhäuser Verlag Basel. Berlin. Boston, 1995, 188 p., ISBN 3-7643-2931-9.

This monograph presents a unified approach to the investigation of a general class of functional equations based on the examination of functional operators and Banach algebras generated by them, synthesizing methods involving dynamical systems, operator algebras and pseudodifferential operators. Special attention is paid to spectral properties of functional operators, and index formulas are derived. Applications are given to functional equations, boundary value problems and equations of convolution type. The book is addressed to a broad range of mathematicians and advanced students interested in functional analysis, differential and integral equations.

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