Mathematica Bohemica

Book Reviews

BOOK REVIEWS

Laurent Decreusefond, Jon Gjerde, Bernt Øksendal, Ali Süleyman Üstünel (eds.):
STOCHASTIC ANALYSIS AND RELATED TOPICS VI. The Geilo Workshop, 1996.
Progress in Probability 42, Birkhäuser, Boston, 1998, xii+409 pages, ISBN 0-8176-4018-5,
DM 268,–.

The volume under review comprises twenty one papers contributed by participants of the
sixth workshop on "Stochastic analysis and related topics". These workshops, taking place
every two years, at first in Silivri, later in Oslo, have become well known, in particular,
for their proceedings containing many important contributions. Also in the present book
various topics of current interest in stochastic analysis are addressed. Problems and methods
coming from infinite dimensional analysis (as e.g. stochastic partial differential equations or
tools of the Malliavin calculus) deserve being mentioned separately, but the reader finds also
papers on stochastic control or probability models with p-adic probabilities. The volume
opens with two very useful survey papers, based on invited lectures. The first on stochastic
delay equations is by S.-E. A. Mohammed, the second on backward stochastic differential
equations and their applications to viscosity solutions of partial differential equations by
É. Pardoux.

Bohdan Maslowski, Praha

V. Rovenskii: FOLIATIONS ON RIEMANNIAN MANIFOLDS AND SUBMANI-
FOLDS. Birkhäuser, Basel, 1998, x+286 pages, hardcover, ISBN 3-7643-3806-7, DM 168,–.

The book can be divided into two parts. The first part is devoted to the geometry and
topology of riemannian foliations, while the second part deals with special submanifolds of
riemanian manifolds. By a special submanifold we mean here (roughly speaking) a subma-
nifold endowed with a foliation. (They generalize e. g. ruled and tubular surfaces from the
classical differential geometry.) It is a highly specialized monograph covering a wide variety
of results from this part of differential geometry and including many results of the author
himself. On the other hand, it can be quite well used by postgraduate students in rieman-
nian geometry. The prerequisites necessary for reading this book are the basic knowledge of
differentiable manifolds and familiarity with the basic concepts of riemannian geometry. For
example, the theory of foliations is already explained from the very beginning. We can find
here many examples. There are also many important comments concerning the contempo-
rary research and showing the relations to other branches of the theory. In the end there
are three appendices. Appendix A was written jointly with V. Topogonov and is devoted to
the Topogonov conjecture. The references go up to 1996 and have 657 items.

Jiří Vanžura, Brno

J. H. Kwak, S. Hong: LINEAR ALGEBRA. Birkhäuser, Basel, 1997, 384 pages, hardcover, ISBN 3-7643-3999-3, DM 58,–.

The purpose of this book is to provide a basic introduction to linear algebra, starting with the very basic concepts (linear equations, matrices, Gauss elimination) and finishing with the Jordan canonical form and the Cayley-Hamilton theorem. Topics covered include determinants, vector spaces and bases, linear transformations, inner products and orthogonality, eigenvectors and eigenvalues, the spectral theorem for (complex) normal matrices, and quadratic forms. The presentation is very rigorous and thorough and a lot of exercises are supplied, most of them with solutions given at the end of the book. Last but not least, important applications are frequently mentioned in control theory, optimization, PDE, approximation theory, computer graphics, etc., which makes the book especially suitable for applied science and engineering-minded audience.

Miroslav Engliš, Praha

Lokenath Debnath: NOLINEAR PARTIAL DIFFERENTIAL EQUATIONS FOR SCIENTISTS AND ENGINEERS. Birkhäuser, Boston, 1997, xvii+593 pages, hardcover, ISBN 0-8176-3902-0, DM 138,–.

The book offers an introduction to nonlinear partial differential equations and methods of their resolution. The scope of the book is sufficiently large to cover the most important problems including nonlinear, mostly evolutionary partial differential equations. In twelve chapters the reader can find classical methods for solving linear partial differential equations, nonlinear model equations and their connection to variational principles, basics of the theory of first order, quasilinear and conservation law equations. Nonlinear dispersive and reaction-diffusion effects are widely treated, solitary waves produced by nonlinear equations such as Schrödinger, Klein-Gordon and Sine-Gordon equations are surveyed. Finally, asymptotic methods for selected problems are presented. The book contains a surprisingly large amount of material, carefully presented, on the basis of long lasting author's lecturing activities. Rather then proofs the author presents ideas, explanations, motivation by applications in different fields of science and, of course, many illuminating computations. Up-to-date references and historical remarks allow the reader to quickly penetrate a selected field of interest. For getting acquainted with a concise survey of important issues concerning applicable nonlinear partial differential equations, one of the best ways is to read this book. It will be appreciated not only by higher level undergraduate university students but by postgraduates and scientists beginning their carreer in the field as well. A classical course of analysis is sufficient to read this book.

Ivan Straškraba, Praha

F. van Breugel: COMPARATIVE METRIC SEMANTICS OF PROGRAMMING LANGUAGES. Birkhäuser, Boston, 1998, 240 pages, ISBN 3-7643-3927-6, DM 138,–.

The topic of this book is semantics for programming languages with nondeterministic constructions. This is an active research area, and the book provides an up-to-date picture of this field.

Nondeterministic constructions studied in the book range from simple nondeterministic choice to dense choice. Nondeterministic choice arises naturally in languages for concurrent programming (e.g., in the form of different execution order of statements performed by different processors), while the more complicated dense choice arises in the languages dealing with real-time actions. Such constructs are important in modern languages, and studying their semantics brings new deep problems.

Two basic approaches to semantics are the operational and denotational semantics. The book takes simple languages containing the nondeterministic constructs and gives both the operational and denotational semantics for them, comparing and relating these different views.

Traditionally, denotational semantics uses partial orders as basic objects, technically relying on the least fixed point theorem. This book chooses another approach, developed by the Amsterdam Concurrency Group during the last decade. Here the basic objects are metric spaces, which opens the possibility of using Banach's fixed point theorem for contractive functions and similar technical tools in place of the least fixed point for partial orders.

Naturally, an advanced text in this area is technically difficult. However, the book is very precise and well written, which helps to ease this burden. The book is primarily aimed at specialists in the area of semantics, but it is self-contained and can serve as a valuable reference for graduate students and researchers in related areas.

Jiří Sgall, Praha

J. Nohel, D. H. Sattinger (eds.): SELECTED PAPERS OF NORMAN LEVINSON. (Vols 1 and 2), Birkhäuser, Boston, 1998, xl+533+xxii+550 pages, DM 778,–.

This two volume set is devoted to Norman Levinson (1912–1975), one of the most respected mathematicians in our century.

The collection of Levinson's papers is divided into thematic parts: Stability and asymptotic behaviour of solutions of ordinary differential equations, Nonlinear oscillations and dynamical systems, Inverse problems for Sturm-Liouville and Schrödinger operators, Eigenfunction expansions and spectral theory of ordinary differential equations, Singular perturbations of ordinary differential equations, Elliptic partial differential equations and Integral equations in the first volume and Harmonic and complex analysis, Stochastic analysis, Elementary number theory and the prime number theorem, The Riemann Zeta-function, Zeros on the critical line, Omega results for the Riemann Zeta-function and Miscellaneous topics in the second volume.

A biography of N. Levinson is presented and some of the mathematical parts of the collection are commented by respectively B. Conrey, B. Levitan, J. Moser, J. Nohel, M. Pinsky, A. Ramakrishnan, R. Redheffer, D. H. Sattinger, H. Sussman and E. Zeidler.

This two volume set of Levinson's papers will serve the mathematicians by showing them the influence of Levinson on mathematical research in our century. The editors have done an excellent work.

Štefan Schwabik, Praha

Ernst Eberlein, Marjorie Hahn, Michel Talagrand (eds.): HIGH DIMENSIONAL PROBABILITY. Progress in Probability 43, Birkhäuser, Basel, 1998, viii + 330 pages, ISBN 3-7643-5867-X, DM 148,–.

The twenty papers included in the book under review were contributed by participants of a conference "High dimensional probability" which was held in Oberwolfach in the year 1996. Let us quote a few sentences from the Editors' Introduction to the proceedings as they explain the intention of that meeting in a very clear way. "That conference followed a long series of meetings that were called 'Probability in Banach Spaces'. ... One of the most remarkable features of the study of Probability in Banach spaces is that this study has given impetus to a number of methods whose importance goes far beyond the original goal of extending limit laws to the vector valued case. ... The papers in this volume reflect the vitality and diversity of the newly evolving field. ... Yet, most of the papers exhibit

the influence of the past through two common ingredients—high dimensions and the use of abstract methods."

Indeed, the articles, all being full length papers with proofs, are joined together by general approach rather than by particular topics. Many of them are devoted to empirical processes, but the reader can also find a paper on convergence in law of random elements and random sets by J. Hoffmann-Jørgensen or M. Ledoux's paper containing a short self-contained proof of the Gaussian isoperimetric inequality.

Ivo Vrkoč, Praha

S. D. Eidelman, N. V. Zhitarashu: PARABOLIC BOUNDARY VALUE PROBLEMS. Operator Theory, Advances and Applications, Vol.101, Birkhäuser, Basel, 1998, 312 pages, ISBN 3-7643-2972-6, DM 238,–.

The book is devoted to the theory of boundary value problems for parabolic equations and systems in a very general setting.

It starts with basic notions on parabolic systems in the sense of Petrovskii and Solonikov and general initial and boundary value problems, accompanied with various illustrative examples. Chapter II has an auxiliary character and contains basic properties of the space of distributions and of the isotropic and anisotropic Sobolev-Slobodetskii spaces H^s, $\mathcal{H}^s$. Action of differential operators in these spaces as well as commutation formulas are included in Chapter III and form a basis for further explanation. Chapter IV forms the core of the book. It is devoted to an analysis of boundary value problems in a half-space, in the spaces of ordinary functions and distributions of arbitrary finite order. Compatibity conditions of initial and boundary values are important for increasing regularity of solutions up to the boundary and make essential use of doubly anisotropic spaces. Boundary value problems in cylindrical domains and some of their applications are studied in Chapter V. The results are generalized to nonlocal boundary value problems. A survey of results on initial and boundary value problems in classical spaces of continuous functions is given without proofs in Chapter VI. Asymptotic behaviour of solutions to model problems and their stabilization as time tends to infinity close the exposition.

The monograph provides a self-contained presentation of the theory and offers an insight into the subject in a general context. It is addressed to researches and graduate students with interest in the boundary value problems.

Hana Petzeltová, Praha

C. Foias, A. E. Frazho, I. Gohberg, M. A. Kaashoek: METRIC CONSTRAINED INTERPOLATION, COMMUTANT LIFTING AND SYSTEMS. Operator Theory, Advances and Applications, Vol. 100, Birkhaüser, Basel, 1998, 600 pages, DM 238,–.

The classical Nevanlinna-Pick problem is to find (if possible) an analytic function bounded by 1 on the open unit disc, with prescribed values at finitely many points. The commutant lifting theorem, which is one of the main results of the Sz.-Nagy-Foias dilation theory, made it possible to prove the interpolation results of Nevanlinna-Pick and others by operator theoretical methods. This approach has been further studied and essentially generalized.

The monograph (which is a continuation of the previous book of Foias and Frazho in the same series—OT 44, 1990) presents a unified approach to various interpolation results. It includes the operator-valued versions of the Nevanlinna-Pick problem, the Hermite-Fejér problem, the Nehari problem, the Sarason problem, and the two-sided Nudelman problem. The central result is the "three chains completion theorem" which makes it possible to solve

also the non-stationary versions of the above mentioned problems. The motivation for this more general setting arises from the H^∞ control theory.

The book considers also explicit constructions of central solutions, parametrization of all solutions, and connections with the notion of entropy.

The book is self-contained but the knowledge of the dilation theory is recommended. It will be interesting for a wide group of mathematicians and engineers.

Vladimír Müller, Praha

I. Gohberg, R. Mennicken, C. Tretter (eds.): DIFFERENTIAL AND INTEGRAL OPERATORS. International Workshop on Operator Theory and Applications, IWOTA 95; Regensburg, July 31–August 4, 1995. Operator Theory, Advances and Applications, Vol.102, Birkhäuser, Basel, 1998, 328 pages, hardcover, ISBN 3-7643-5980-4, sFr. 148.–

This is the first volume of the proceedings dedicated to the eighth workshop in the series IWOTA held at the University of Regensburg in 1995. It contains a collection of 22 contributions to the theory of differential and integral operators. They cover different aspects of linear and nonlinear spectral problems with applications to ordinary differential, partial differential, evolution, pseudo-differential and integral equations. Several contributions are also focused on the operator theory in spaces with indefinite metric, operator functions, interpolation and extension problems. The proceedings are edited in a very good manner, all statements are proved in detail. The book can be useful to a wide-ranged community of readers interested in pure and applied mathematics and physics.

Milan Tvrdý, Praha

I. Gohberg, R. Mennicken, C. Tretter (eds.): RECENT PROGRESS IN OPERATOR THEORY. International Workshop on Operator Theory and Applications, IWOTA 95, Regensburg, July 31–August 4, 1995, Operator Theory, Advances and Applications, Vol. 103, Birkhäuser, Basel, 1998, 288 pages, sFr 148,–.

The volume contains the second part of the proceedings of the Workshop on Operator Theory and Its Applications IWOTA 95, which was held at the University of Regensburg, Germany, 1995.

The conference was devoted to various aspects of linear and nonlinear spectral problems. In particular, the workshop was focussed on spectral theory of differential operators, operator theory in spaces with indefinite metric, operator functions, interpolation and extension problems. Applications in mathematical physics, hydrodynamics, quantum mechanics and system theory were also considered.

This volume contains the contributions concerning various aspects of operator theory and its applications; the previous volume (OT series, vol. 102) was concentrated especially on differential and integral operators.

Vladimír Müller, Praha

A. N. Kolmogorov, A. P. Yushkevich (eds.): MATHEMATICS OF THE 19TH CEN-
TURY. Vol. 3, Birkhäuser, Basel, 1998, x+358 pages, DM 148,–.

This is the third volume of the translation from Russian of a survey of mathematics of
the 19th century. The present (and last) volume contains a decription of the following fields
of mathematics: 1. Function theory according to Chebyshev (written by N. I. Akhiezer),
2. Ordinary differential equations (on the basis of the manuscript of N. I. Simonov rewritten
by S. S. Demidov), 3. Calculus of variations (written by A. V. Dorofeeva) and 4. Calculus of
finite differences (presented by S. S. Petrova and A. D. Solov'ev).

A very nice presentation of the story of all topics mentioned above. The role of Russian
mathematicians is emphasized in the individual chapters.

This book should to be read by all mathematicians interested in the history of mathe-
matics in the 19th century.

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Štefan Schwabik, Praha

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S. Thangavelu: HARMONIC ANALYSIS ON THE HEISENBERG GROUP. Progress
in Mathematics, Vol. 159, Birkhäuser, Basel, 1998, 208 pages, hardcover, ISBN 3-7643-
4050-9, DM 108,–.

The Heisenberg group plays an important role in several branches of mathematics, and
is in some sense the simplest among the non-commutative Lie groups. In this excellent
monograph, the author shows how the standard results of the classical euclidean harmonic
analysis, such as the Plancherel and the Paley-Wiener theorem, Wiener Tauberian theo-
rems, Bochner-Riesz means, multipliers for the Fourier transform, etc., generalize to the
Heisenberg group and what shape they take in this simplest non-commutative setting.
The first chapter covers the basic machinery of the Fourier and Weyl transforms, Hermite
expansions and the representation theory of the Heisenberg group. The second chapter in-
troduces the sublaplacian and develops its spectral theory, culminating in a version of the
multiplier theorem for the Fourier transform. The third chapter studies spherical functions
and the spherical mean value operator, and in the last fourth chapter, the reduced Hei-
senberg group is introduced and some of the results of the preceding chapters are improved
in that context. The exposition is lucid and skillfully written, and the required prerequi-
sites do not go beyond a good foundation of Euclidean harmonic analysis. For any reader
interested in the analysis on the Heisenberg group, or non-commutative harmonic analysis
in general, this will be a most welcome book.

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Miroslav Engliš, Praha

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K. Bichteler: INTEGRATION—A FUNCTIONAL APPROACH. Birkhäuser, Basel,
1998, 208 pages, sFr. 68.–

The present book of K. Bichteler is a concise introduction to Daniell's approach to the
construction of the (Lebesgue) integral.

An introductory chapter (Review) starts the exposition. A certain version of the Weier-
strass approximation theorem is recalled with a review of the classical Riemann integration.
This part of the book is in fact a link to concepts known from starting courses in real ana-
lysis.

The core of the theory presented in the book is given in the second chapter (Extension
of the Integral). It is based roughly speaking on the closure of step functions under the
seminorm given by the Daniell mean.

Measurability, Classical Banach spaces and Operations on Measures are the titles of the
remaining chapters of the book. The construction of the integral given in the second chapter

is used, it is shown that in this way classical concepts can be presented with less effort in comparison with the usual approach based on the historical development of the subject.

Problems and exercises are presented at many places of the text, answers or hints for solving some of the problems are given at the end of the book.

The present book of K. Bichteler gives an alternative look at the construction of the Lebesgue type integration. It can serve as the source for an advanced course for graduates and also for mathematicians as a good reference for the Daniell approach to integration.

Štefan Schwabik, Praha

R. Berndt, R. Schmidt: ELEMENTS OF THE REPRESENTATION THEORY OF THE JACOBI GROUP. Birkhäuser, Basel, 1998, 232 pages, DM 108,–.

The group, which takes the name of Jacobi, is a semidirect product of a symplectic group $Sp(2n, R)$ with a Heisenberg group $H_n(R)$, where R is a given commutative ring with unit. For $n = 1$, $Sp(2, R)$ is simply the group $SL(2, R)$ and $H_1(R)$ is the group of 3×3 upper triangular matrices with units on the diagonal and is denoted by $G^J(R)$. For $R = \mathbb{Z}$, the ring of integers $G^J(\mathbb{Z})$ forms a frame for treating classical Jacobi theta functions, their transformations and the elliptic and abelian functions. This classical theory has a deep and far-reaching generalization to n dimensions, but this is not the aim of the book: it is devoted to the study of the group $G^J(R)$ from the representation point of view. The non specialist may wonder why to devote a monograph to one special group. The intrinsic justification seems to be the following: the general theory of automorphic forms and their representations has been so far developed for reductive algebraic groups. The Jacobi group, together with the Heisenberg group, is the most evident example of the non-reductive algebraic group and it is important to know what parts of the general theory extend to the first more general example. In the global case (R is an algebraic number field F), the theory for $G^J(F)$ is aimed at the correspondence between automorphic representations on Jacobi forms and so it forms a complement to the fundamental book on Jacobi forms by M. Eichler and D. Zagier. If R is a local field (archimedean or not), complete classification theorems for irreducible representations are obtained. From the other themes we recall the following ones: Whittaker models, Hecke operators, the spherical representation in the (local) p-adic case, the definition of theta functions in the global case.

The book contains results of the authors' original research. For non specialists the reading of the book is difficult, it is largely determined for specialists and researchers in the field of algebraic groups.

Jaroslav Fuka, Praha

R. Séroul, S. Levy: TEX PRAXIS. Birkhäuser, Basel, 1998, xiv+425 pages, DM 68,–.

This German version of a book devoted to TEX is based on the English translation of the French original.

TEX is our new way to communicate mathematics, it has many possibilities and not all of us are patient enough to go into all the sophisticated details of D. Knuth's TEXbook.

The present book represents an attempt to offer an easy way to the basic constructions of PlainTEX for mathematics together with instructive examples. A large vocabulary and glossary accompanies the text and there is no doubt that this—from the didactic viewpoint nicely presented—book will serve the mathematical writer.

Štefan Schwabik, Praha

Arik Melikyan: GENERALIZED CHARACTERISTICS OF FIRST ORDER PDES. Applications in Optimal Control and Differential Games. Birkhäuser, Basel, 1998, 310 pages, DM 178,–.

In the last 15 years, a general approach, based on the notion of viscosity solution to fully nonlinear first and second order partial differential equations, has been developed. This theory provides very general existence and uniqueness results for a large class of problems satisfying the maximum principle. The present monograph is devoted to the construction of the viscosity solutions to the first order nonlinear equations based on the notion of singular characteristics. These represent a modification of the classical (regular) characteristics and solve a system of ordinary differential equations related to the original problem. Combining regular and singular characteristics one can construct the (nonsmooth) viscosity solutions to a vast class of nonlinear problems.

Chapter 1 is devoted to the basic theory of characteristics for problems possessing smooth solutions.

In Chapter 2, generalized solutions and singular characteristics are introduced for the first order nonlinear partial differential equations.

Chapter 3 deals with concrete examples of equations arising in variational calculus, optimal control theory and differential games. The differential games theory is further developed in Chapters 4, 5.

In Chapter 6, problems with nonsmooth Hamiltonians are attacked while Chapter 7 is devoted to the study of shock waves developed by solutions to the first order equations.

In Chapter 8, some second order nonlinear equations in variational form are dealt with.

Each chapter is supplemented by concrete examples and exercises. The book will be certainly useful for researchers as well as students and post-graduate students in mathematics, physics and engineering.

Eduard Feireisl, Praha

H. Bercovici, C. Foias (eds.): NONSELFADJOINT OPERATOR ALGEBRAS, OPERATOR THEORY, AND RELATED TOPICS. The Carl Pearcy Anniversary Volume, Operator Theory, Advances and Applications, Vol. 104, Birkhäuser, Basel, 1998, 201 pages, DM 138,–.

The volume is dedicated to Carl Pearcy on his 60th birthday. It contains recent contributions to operator theory, nonselfadjoint operator algebras, theory of moments, and measure theory written by leading experts in the field.

Carl Pearcy has been one of the most influential personalities in the operator theory. He influenced research in the operator theory not only directly through his work, but also indirectly through his numerous students. Many of the contributors of this volume are his former students or collaborators.

Vladimír Müller, Praha

H. Begehr, H. Koch, J. Kramer, N. Schappacher, E.-J. Thiele (eds.): MATHEMATICS IN BERLIN. Birkhäuser, Berlin, 1998, xi+200 pages, DM 28,–.

A survey of mathematical activities in Berlin from 1700 till the present time. Both the institutions connected with mathematics and the mathematicians who have had some relation to Berlin are mentioned. The book was prepared for mathematicians attending the 1998 International Congress of Mathematicians in Berlin. There are many interesting facts and also nice pictures of mathematicians.

Štefan Schwabik, Praha

George Grätzer: GENERAL LATTICE THEORY. Second Edition, New appendices by B. A. Davey, R. Freese, B. Ganter, M. Greferath, P. Jipsen, H. A. Priestley, H. Rose, E. T. Schmidt, S. E. Schmidt, F. Wehrung, R. Wille. Birkhäuser, Basel, 1998, 666 pages, hardcover, DM 218,–.

A lattice is a very universal kind of an algebra and like groups it occurs in many contexts. However, the theory of lattices is almost orthogonal to the theory of groups with a completely different type of results. Lattice theory is also a relatively new branch of mathematics. Papers on this topic were written in the first half of this century and the famous book by Garrett Birkhoff appeared in 1940 (first edition), but only in fifties it became a separate field of algebra with mathematicians specializing in it, including a leading expert George Grätzer. The field grew rapidly and writing a monograph covering new results became almost a necessity. Thus in 1978 the first edition of the reviewed book appeared. Unlike the classical Birkhoff's book which covered an extremely large area of fields of mathematics where the concept of a lattice occurs, Grätzer's book concentrated more on the 'inner' results of lattice theory. Lattices were studied as a special kind of universal algebras.

Already when the first edition appeared the number of results in lattice theory was so great that it was hardly possible to cover the field completely in one volume. The selection of topics and results, nonetheless, was very representative. In six chapters (First Concepts, Distributive Lattices, Congruences and Ideals, Modular and Semimodular Lattice, Varieties of Lattices, Free Products) the theory was developed gradually with carefully written proofs and many exercises.

The reviewed volume is the second edition of the book. In order to cover the great amount of new results, Grätzer added several appendices to the original edition. The first appendix comments further development in the areas covered in the chapters of the first edition and is written by himself. For the other 7 appendices Grätzer invited 11 experts in lattice theory. These mathematicians had written monographs or survey papers on special topics in lattice theory. The appendices present main results in their fields in a condensed form in chapters of an average length of 15 pages. The topics are: Distributive lattices and duality, Congruence lattices, Continuous geometry, Projective lattice geometries, Varieties of lattices, Free lattices, Formal concept analysis. The style of this part is of the form of popular 'handbooks', which means a lot of theorems with no proofs. The advantage of it is a great variety of results; the disadvantage is that it cannot be used as a textbook.

Pavel Pudlák, Praha

V. S. Sunder: FUNCTIONAL ANALYSIS. SPECTRAL THEORY. Birkhäuser Advanced Texts. Birkhäuser, Basel, 1998, 246 pages, hardcover, ISBN 3-7643-5892-0, DM 78,–.

This volume is a textbook on the standard fundamentals of functional analysis, from normed linear, Banach and Hilbert spaces (Chapters 1–2) to basic operator theory up to the spectral theorem for (bounded normal and unbounded self-adjoint) operators (Chapters 4–5). Perhaps slightly less standard, in comparison to other textbooks at this level, is the inclusion of the basic theory of C^* and von Neumann algebras (Chapter 3), which makes it possible to give an elegant treatment of the spectral theorem. The exposition is masterfully written and interspersed with numerous exercises. Several appendices are also attached on the prerequisites from algebra, topology, measure theory, etc., in order to make the book self-contained. In the reviewer's opinion, this is a very nice book and a safe and recommendable choice for anyone in need of an introductory course on functional analysis.

Miroslav Engliš, Praha

A. Balog, G. O. H. Katona, D. Sza'sz, A. Recski (eds.): EUROPEAN CONGRESS OF MATHEMATICS. Budapest, July 22–26, 1996. Progress in Mathematics, Birkhäuser, Basel, 1998, hardcover. Vol. 1: 334 pages, ISBN 3-7643-5497-6, DM 188,–; Vol. 2: 402 pages, ISBN 3-7643-5498-4, DM 188,–; Vols 1+2: 736 pages, ISBN 3-7643-5496-8, DM 318,–.

The European Mathematical Society decided that European Congress of Mathematics should be held every fourth year, in the middle of the periods between International Congresses of Mathematicians organized by the IMU. Each congress should have a unifying theme and there should be a large space for round table discussions devoted to important and hot topics concerning mathematics and its position in the society.

The first ECM held in 1992 in Paris was a great success and a good start of the new series of summit European mathematical events. A new tradition was launched there to award prizes to ten young European mathematicians.

The second European Congress of Mathematics was organized by the János Bolyai Mathematical Society in Budapest from 22nd to 26th July, 1996. The unifying theme of the congress "Unity of Mathematics" was well reflected by the choice of invited speakers across the range of mathematics and its applications as well as in the contents of their lectures.

The proceedings of the congress are published in two volumes and contain addresses by J.-P. Bourgignon, President of the EMS, by G. Demszky, Mayor of City of Budapest, by A. Goncz, President of Hungary, and by G. O. H. Katona, Chairman of the Organizing Committee, characteristics of 10 prize winners, 40 lectures of the main speakers and of speakers invited to parallel sections, and comprehensive reports on seven round tables. No mathematical library should miss it.

Jiří Rákosník, Praha

H. Amann, J. Escher: ANALYSIS I. Birkhäuser, Basel 1998, x+445 pages, softcover, DM 48,–.

The first volume of a proposed three volume introduction to Calculus written in German. It is based on the university lectures of the authors (Bochum, Kiel, Zürich and Basel, Kassel).

An extensive introductory chapter is devoted to the fundamentals and the background of Calculus (logic, sets, mappings, theory of natural and real numbers, algebraic concepts—groups and homeomorphisms, rings, fields, polynomials, the concept of rationals, complex numbers and some basic things from vector spaces and linear algebra).

The second chapter concerns convergence of sequences, series, completeness and everything connected with these concepts.

Continuity and continuous functions are dealt with in the third chapter.

The fourth chapter is devoted to differentiation and the final fifth chapter deals with sequences of functions.

This first volume of a comprehensive explanation of Calculus presents mainly the theory of real functions. The necessary theoretical background material is presented in full extent and at many places general concepts are presented which will be surely of great influence to the students in the study of advanced parts of mathematics, e.g. topology or functional analysis. There is a big number of exercises and the first volume of this basic work is promising a very good and deep comprehensive text for introductory studies in the field of mathematical analysis.

Štefan Schwabik, Praha