Book reviews

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BOOK REVIEWS

Joseph W. Dauben, Christoph J. Scriba: WRITING THE HISTORY OF MATHEMATICS: ITS HISTORICAL DEVELOPMENT. Birkhäuser, Basel, 2002, 689 pages, EUR 120.–.

The monograph represents the first and exceptionally complex survey of the evolution of history of mathematics as a stand-alone scientific discipline. It covers the time period from the 4th century B.C., when the first known works on the history of mathematics were written by Eudemus of Rhodes, a disciple and friend of Aristotle, over the birth of modern historiography of mathematics in the 18th century, till the end of the 20th century; a turning point is given by the early 1970s, when the *International Commission on the History of Mathematics* and the Commission's journal named *Historia Mathematica* were founded (particularly due to the efforts of Kenneth O. May, to whom the monograph is dedicated); nevertheless, in most cases the development up to the present is outlined, too.

The book is divided into three main parts. The first and most extensive one is subdivided into 20 chapters, 19 of which are devoted to the history of historiography in different countries; the last chapter written by J. W. Dauben, J. Peiffer and Ch. J. Scriba, denoted as *Postscriptum*, contains an interesting discussion of the concept, character, interrelations, history and functions of historiography (not only) of mathematics, as well as the outline of recent trends and the useful survey of electronic resources. The chapters devoted to particular countries provide a wide overview of the development of the discipline in question successively in France, where the first comprehensive history of mathematics written in the West was published, namely J. E. Montucla's monumental work *Histoire des mathématiques* from 1758 (the chapter was written by J. Peiffer), further in the nearby countries of Benelux (P. Bockstaele), Italy (U. Bottazzini), Switzerland (E. Neuenschwander), Germany (M. Folkerts, Ch. J. Scriba, H. Wussing), Scandinavia (K. Andersen), The British Isles (I. Grattan-Guinness), Russia and the U.S.S.R. (S. S. Demidov), Poland (S. Domoradzki, Z. Pawlikowska-Brozek), Bohemian countries (L. Nový), Austria (Ch. Binder), Greece (Ch. Phili), Spain (E. Ausejo, M. Hormigón), Portugal (L. M. R. Saraiva), The Americas (U. D'Ambrosio, A. R. Garciadiego, J. W. Dauben, C. G. Fraser), Japan (S. Chikara), China (Liu Dun, J. W. Dauben), India (R. Ch. Gupta), Arab countries, Turkey and Iran (S. Brentjes).

The second part of the book contains portraits of 24 and biographies of 300 historians of mathematics. The last part of the monograph provides the list of abbreviations, detailed bibliography and index.

It is fully understandable that each author of the analysis of his respective country had to choose only few of all historians of mathematics, as well as only few fundamental works on the history of this science and few journals and publication series, and that such a choice is always an extremely difficult task invoking an endless discussion about who and what else ought to have been quoted (for example, when Jarník's analysis of Bolzano's function is mentioned, then the coincident and independent proof of continuity and non-differentiability of this function given by Rychlík could be cited, too, as well as—perhaps—some of his other historical works from various fields; on the whole, to stay only in Bohemian countries, there have been more professional mathematicians who have published original and valuable works on the history of mathematics than those mentioned in the book). Naturally, it is clear that if all people connected with the history of mathematics and all publications were included, it would not be a one volume book with 689 pages, but a sort of encyclopedia consisting of many volumes and completely missing the most worthful features that the reviewed monograph actually has: "esprit de corps", the admirably unified style of all chapters written by so many authors, and the revelation of wide historical context and substantial reasons of the passed development.

Finally, it should be emphasized that the monograph makes it clear that mathematics is much more than a body of theorems and proofs produced by mathematicians, and much more than a mere compilation of abstract results: it shows that mathematics and its history are themselves part of larger cultural histories.

M. Hykšová, Praha

A. W. Knapp: LIE GROUPS BEYOND AN INTRODUCTION. Second edition. Birkhäuser, Basel, 2002. ISBN 0-8176-4259-5, hardcover, 816 pages, EUR 88.–.

The first edition of the present book appeared in 1996, and quickly became one of the standard references on the subject. (The latter applies equally well also to the other book by the author, *Representation theory of semisimple Lie groups: an overview based on examples,* Princeton University Press 1986.) It offered a thorough exposition of Lie theory, starting from the basics (Lie algebras, Lie groups, solvability, nilpotence, semisimplicity, root systems, universal enveloping algebras) and proceeding through the fundamentals of representation theory (Peter-Weyl theorem, the theory of highest weight) to the more advanced topics like the structure theory of semisimple Lie groups, parabolic subgroups, or the Weyl integration formula. The present edition has been perfected even further, apart from straightening occasional errors that have intruded into the text and making various revisions and updates throughout, by adding a new Introduction and two new Chapters IX and X. The Introduction develops directly some of the elementary theory just for the matrix groups, thus furnishing the reader right away with a useful stock of concrete and intuitive examples. Chapter IX contains a treatment of induced representations and branching theorems, which is a most welcome addition in view of the numerous applications in mathematical physics, combinatorics, and elsewhere. Chapter X is largely about actions of compact Lie groups on polynomial algebras, pointing toward invariant theory and some routes to infinite-dimensional representation theory.

The exposition is supplemented by numerous examples throughout the text, problems at the end of each chapter, historical notes near the end of the book, and three Appendices, on tensor algebra, Lie's third theorem, and a tabulated summary of all irreducible root systems and simple Lie algebras, respectively.

This is an excellent monograph, which, as with the previous edition, can be recommended both as a textbook or for reference to anyone interested in Lie theory.

Miroslav Engliš, Praha

R. Rebolledo: STOCHASTIC ANALYSIS AND MATHEMATICAL PHYSICS II. 4th International ANESTOC Workshop in Santiago, Chile. Birkhäuser, Basel, 2003, hardcover, ISBN 3-7643-6997-3, 162 pages, EUR 64.–.

The proceedings contain refereed articles from the Fourth International Workshop on Stochastic Analysis and Mathematical Physics held in Santiago, Chile from January 5 to 11, 2000.

The book contains ten contributions on quantum information and quantum stochastic analysis, stochastic processes in random media, nonlinear methods for continuum mechanics and other subjects such as applications of classical probability to Burgers equation, the general quantum probability (the noncommutative theory of capacities, quantum codes, Fock spaces on the complex unitary disk) and quantum dynamics for closed and open systems.

The audience to whom the book is addressed includes mainly mathematical physicists and specialists in probability theory, stochastic analysis and operator algebras.

Martin Ondreját, Praha

Ioan I. Vrabie: C_0-SEMIGROUPS AND APPLICATIONS. North-Holland Mathematics Studies, vol. 191, Elsevier, 2003, pp. xii+373, hardcover, ISBN 0-444-51288-8, EUR 98.–.

The book gives a systematic presentation of the theory of linear semigroups and its applications. It contains not only the classical theory but also some very recent results both in the theory and in non-standard applications. Some partial differential operators generating C_0-semigroups are studied and applied to the classical parabolic and wave equations as well as to the Maxwell, the Schrödinger, the Airy equations, and also to the linear thermoelasticity and viscoelasticity. Characterizations of special classes of C_0-semigroups, such as equicontinuous, compact, differentiable and analytic ones are given and exploited in chapters dealing with semilinear and even fully nonlinear parabolic equations. Equations with dynamical boundary conditions and equations involving measures are also studied in the semigroup setting.

There is a set of problems included at the end of each chapter, all of them completely solved in the last section of the book.

The book is self-contained, requires only some acquaintance with functional analysis and partial differential equations. It is addressed to graduate students and researchers in the field, but it would be useful also for physicists and engineers interested in mathematical models expressed in terms of differential equations.

Hana Petzeltová, Praha

G. Belitskii, V. Tkachenko: ONE-DIMENSIONAL FUNCTIONAL EQUATIONS. Birkhäuser, Basel, 2003, 224 pages, hardcover, EUR 98.–.

The monograph is devoted to the study of functional equations with the transformed argument on the real line and on the unit circle. It consists of five chapters. Chapter 1 is dedicated to standard questions related to the equation on implicit functions. Here, theorems on local and global solvability are established. In Chapter 2, the Abel equation, or the more general cohomological equation, and the Schröder equation are investigated in detail. Chapter 3 deals with the generalized Abel equation. Here, theorems on local solvability in a neighborhood of a non-fixed point, as well as at an isolated fixed point are established. The question on the global solvability of an equation with no more than one fixed point, and of an equation with several fixed points, is studied as well. In Chapter 4, theorem on the existence of a local solution of the equation with several transformations of argument is proved. Some assertions guaranteeing the extendability of a local solution of the equation considered are also established. In the last section of Chapter 4, the decomposition method, used in the proofs of previous assertions of Chapter 4, is modified for solving a linear difference equation in Carleman classes. In Chapter 5, the properties of a certain class of linear operators in linear topological spaces are studied. Some conditions of surjectivity, of normal solvability, and of the Fredholm property for the operators considered are obtained.

The methods developed in the book are described in detail and illustrated on numerous examples. The book covers a wide range of topics in theory of functional equations, the exposition is self-contained, and the necessary technical preliminaries are integrated into the text. It may be useful either for self-study or as a convenient reference book.

Robert Hakl, Brno

J. Schönbeck: EUKLID. Vita Mathematica 12, Birkhäuser, Basel, 2003, 264 pages, ISBN 3-7643-6584-6, EUR 82.24,–.

This German written book is devoted to the life and work of Euclid of Alexandria, one of the most important mathematicians and especially geometers in the antiquity, to the man who influenced mathematics from the third century B. C. up to now.

In the first chapter the author writes about the scientific and political life in Alexandria in the fourth and third century B. C. He shows the great atmosphere for scientific work, then he sums information which we know about Euclid, his predecessors and successors.

In the second chapter we can find a summary of Greek mathematics before Euclid (from Pythagoras of Samos to "Plato Academy" in Athens). The author gives only a short survey of the development of mathematics and great mathematical discoveries which were done before Euclid.

The third and fourth chapters are the main parts of the book. In the first part of the third chapter the author describes the so called "lost" Euclid's works from geometry and logic (Pseudaria, Konika, Topoi pros epiphaneia and Porismata) about which we know from the quotations by Euclid's successors as Apollonius of Perga, Proclus Diadochus, Pappus of Alexandria etc. In the second part the Euclid's works from physics (Mechanica problemata, Musica, Optica and Catoprica) and astronomy (Phaenomena) are described. The third part of this chapter is devoted to the geometrical manuscript and prints (Peri diaireseon (On divisions of figure) and Dedomena (Data)).

The fourth chapter discusses the construction, origin, content, structure, historical context and influence of Euclid's most important mathematical work—"Ta stoicheia—the Elements".

In the fifth chapter the author describes the route of Euclid's works (especially the Elements) throughout Greek, Roman, Byzantine and Arabic culture and science. Then he analyzes the situation in Europe from the Middle Age to the invention of book printing. He shows the most important manuscripts, translations, prints and critical editions of Euclid's works.

The list of bibliography and the author index are included. This excellent book which contains many interesting illustrations can be recommended to people who desire to study the history of "classical" geometry.

Martina Bečvářová, Praha