Bibliographie

S. K. Berberian, Baer $*$-Rings (Die Grundlehren der Mathematischen Wissenschaften in Einzeldarstellungen, Bd. 195), XIII+296 pages, Berlin—Heidelberg—New York, Springer-Verlag, 1972.

As the author states in the preface, this work is an elaboration of Irving Kaplansky's ideas introduced in his book *Rings of operators*. A Baer $*$-ring is a ring with involution in which the right annihilator of every subset is a principal right ideal generated by some projection. Baer $*$-rings are abstract generalizations of von Neumann algebras. Although these rings are much more general than von Neumann algebras, they still have some nice properties of these, for example the projection lattices of all members in a vast class of Baer $*$-rings are continuous geometries in the sense of von Neumann.

The book is a systematic exposition of the theory of Baer $*$-rings. It contains three parts and these parts are subdivided into chapters. The first part deals with the basic concepts and results while the second presents the structure theory. The most delicate and interesting part is the third one on finite Baer $*$-rings where one finds the following chapters: Dimension in finite Baer $*$-rings; Reductions of finite Baer $*$-rings; The regular ring of a finite Baer $*$-ring; Matrix rings over Baer $*$-rings. There are many exercises at the ends of the paragraphs. They are graded A, B, C, D; grade A problems are the easiest ones, grade D problems are open questions. There is a more than twenty page "Hints, Notes and References" part at the end of the book, to help the reader solve the exercises.

J. Szűcs (Szeged)

P. C. Clemmov, An introduction to electromagnetic theory, XI+297 pages, London, Cambridge University Press, 1973.

The book gives a detailed exposition of the basic concepts of the theory of electromagnetism. At the beginning the author points out one of the most fundamental problems of the theory: what is the connection between electromagnetism at microscopic and at macroscopic level. From the misunderstanding of this connection, it resulted a wrong notion, that of the magnetic charges, and led to the confusion of the role of the magnetic quantities B and H for a long time. Nowadays one begins to revide these notions. The author works with B as magnetic field strength and in the last chapter he gives an excellent and clear treatment of space averaging and electromagnetic media with special regard to magnetization and magnetic media. Magnetic charges, even virtual surface charge densities arising from a magnetic dipole density are ruled out.

The book, as its title shows, is introductory. Therefore complicated mathematics are avoided. It would be right, however, to call attention to some mathematical problems which are very elementary in nature and are connected with the relation between microscopic and macroscopic electromagnetism, based on the essential difference between the descriptions of point charges and spatially distributed charges. These mathematical difficulties show the fundamental problems not only of classical electromagnetic theory but also of quantum field theory. To mention the most simple, the equation $\oint Eds=0$ for static field is not valid if the curve of integration passes through a point charge.

Apart from this the book gives a good introduction to the modern theory of electromagnetism with special emphasis on the physical backgrounds. The material is well organized and many special problems are treated to illustrate the results of the theory.

T. Matolcsi (Szeged)

Computers and computation. Readings from Scientific American, 283 pages, San Francisco, W. H. Freeman & Co., 1970.

The book is a collection of papers on computers and computer science appeared during the past two decades in the columns of the *Scientific American* — one of the highest ranking popular magazines in this field. The 25 articles are ordered in five sections, each beginning with introductory remarks of the editors.

The First Section contains articles of primarily technical nature: fundamentals of logic circuitries, elementary programming, etc. The impression gained about the speed of progress, however, turns out to be more interesting than mere technicalities. In 1966 I. E. Sutherland writes: "New devices... are changing computers from hard-to-use consultants into ready tools to aid human thought" — and describes the brand-new graphic display as example. Four years later the same author speaks about a newly developed branch of science: computer graphics complaining about the difficulties in obtaining three-dimensional, colored drawings on the screen. Other articles about computer-aided molecular synthesis, thechnical drawing, etc. provide and abundant illustrative material confirming the correctness of Sutherland's wievs.

Artificial intelligence is the core of the Second Section. The authors are: C. E. Shannon, O. G. Selfridge, M. Minsky, and others. Different implementations as chess-playing algoritms, pattern recognition techniques, linguistic applications, etc., are richly illustrated in that chapter. Although progress in this field of computer science has not been so rapid as in technology, there is enough evidence that yesterday's research is becoming today's routine as, for example, in the printed character recognition. The presently developed new techniques ("interlevel communication", "hierarchically structured artificial intelligence" structures) can easily turn out to be the routines of tomorrow.

The few articles grouped in the Third Section (Mathematics) try to illustrate for the non-professional reader some problems, as the theoretical limit of addition speed available, remainder addition techniques, problems solved and unsolved in mathematical logic, in number theory, combinatorics, etc.. Among the authors are H. Wang, S. M. Ulam and D. D. McCraken.

Since the time of Turing much concern has been focused on determining the set of problems which computers cannot solve. The article by H. Wang shows that questions about the capability all lie in the overlapping area between computer theory and logic. Another question dealt with in the papers of both Ulam and McCraken is the nature of randomness. The problem is illustrated by describing the Monte Carlo technique invented by Ulam and first used to neutron shielding by J. von Neumann. McCraken's examples showing how one can rely on probability in solving real-to-life questions having apparently no relation to it — are really highlighting.

Chapter IV (Modelling) covers a wide-band spectrum of fascinating problems reaching from computer-aided molecular model building to system analysis of man as machine (including genetical reproduction) on the one side, fluid dynamics, meteorological structures and urban transportation systems on the other.

All the articles follow Turing in demonstrating that computers are universal in a nontrivial sense. The calculating power of the sequential machines is of course fundamentally limited in speed by that of light. Much attention is therefore given to parallel processing and examples are to be found illustrating contributions expectable if parallel processing is combined with modelling techniques.

I. Madarász (Szeged)

Siegfried Flügge, Practical quantum mechanics, I—II (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Bd. 177—178), XIV+341, XII+287 pages, Berlin—Heidelberg—New York, Springer-Verlag, 1971.

There are many books introducing to the theory of quantum mechanics but one hardly finds a monograph collecting its practical methods necessary for both theoretical and experimental physicists.

The fundamentally enlarged English edition of the author's book in German published in 1947 fills this gap. The book consists of 219 problems with solutions. It seems so that all important general problems, for instance momentum and angular momentum representations, scattering theory, partial wave expansion, spin functions for two and three particles, many body problems, approximation methods and others are included, followed by applications to diverse special problems. There are chapters devoted to areas beyond the quantum mechanics proper: they contain problems of relativistic quantum mechanics, radiation theory and field quantization. The often needed special functions and series are cited in a Mathematical Appendix.

It is a pity that, in the introductory chapter for general concepts and sometimes elsewhere too, Hilbert space and its operators are used in a formal way only and there are no hints to places where these notions and techniques can be found in an exact form.

Nevertheless, the book may prove to be a useful and perhaps indispensable tool for those who are applying quantum mechanics to various problems in physics.

T. Matolcsi (Szeged)

H. Heyer, Mathematische Theorie statistischer Experimente, XXII+209 Seiten, Berlin—Heidelberg—New York, Springer Verlag, 1973.

Ein statistisches Experiment ist gewisse Auswertung einer Stichprobe mit dem Ziel, auf Grund derselben eine Entscheidung zu treffen. Das Buch bietet eine sehr modrene Darstellung gewisser wichtiger Themakreise der Theorie statistischer Experimente. Die Behandlung beschränkt sich auf die wichtigsten Fragen der Test- und Schätztheorie im finiten Rahmen, also ohne Berücksichtigung der asymptotischen Theorie. Unter Heranziehung von Maßtheorie und Funktionalanalysis wird der allgemeine Erschöpftheitsbegriff (auch im nicht dominierten Fall) diskutiert, die Existenz trennscharfer Tests analysiert, der Begriff der Minimalschätzung eingeführt und die Fragen des Vergleiches von Experimenten ausführlich dargestellt. Die Betrachtungsweise setzt breite Vorkenntnisse aus der Wahrscheinlichkeitstheorie, mathematischer Statistik, und Maßtheorie voraus. Das Lesen wird mit Literaturhinweisen und mit einer Zusammenfassung der angewandten tiefliegenden Sätze erleichtert.

K. Tandori (Szeged)

A. P. Robertson—W. Robertson, Topological vector spaces, second edition (Cambridge Tracts in Mathematics and Mathematical Physics No. 53), VIII+172 pages, Cambridge, University Press, 1973.

The book gives an easily readable introduction to the theory of topological vector spaces. The authors assumed only a minimal knowledge of general topology and linear algebra and what is assumed is compiled at the beginning of the first chapter. After this, new topological concepts are introduced when needed. The first six chapters have supplementary sections containing illustrative examples and further results. The supplements sometimes use notions not, or not yet, defined in the text. The chapter headings are: I. Definitions and elementary properties; II. Duality and the Hahn—Banach theorem; III. Topologies on dual spaces and the Mackey—Arens theorem; IV. Barreled spaces and the Banach—Steinhaus theorem; V. Inductive and projective limits; VI. Completeness and the closed graph theorem; VII. Some further topics (1. Strict inductive limits. 2. Bilinear mappings and tensor products. 3. The Krein—Milman theorem); VIII. Compact linear mappings; Appendix.

There is a bibliography and an index at the end of the book.

The only changes in this second edition with respect to the first one are: 1) the inclusion of an appendix on spaces with webs in order to bring up to date the discussion of the closed graph theorem; 2) the removal of a number of errors and obscurities occurring in the first edition.

J. Szűcs (Szeged)

Derek J. S. Robinson, Finiteness Conditions and Generalized Soluble Groups, Part 1, XV+210 pages; Part 2, XIII+254 pages (Ergebnisse der Mathematik und ihrer Grenzgebiete, Band 62—63), Berlin—Heidelberg—New York, Springer-Verlag, 1972.

The simple but very fruitful idea of investigating those territories in the immense realm of infinite noncommutative groups that lie nearer to the more favourable regions of finite and commutative ones is a perpetual motive of group-theoretical research. It is a great and hard job to systematize the investigations in this area ramifying in many directions so that it is no wonder if till now there has not been any monograph on it. Of course, Part 4 of Kuroš's book "The Theory of Groups" is an excellent introduction to these topics, but it is clear that an independent comprehensive book is needed (e.g., from the fact that the bibliography of such a book must include more than a thousand items — as the considered work of D. J. S. Robinson testifies).

Robinson's book has got a lot of good properties. Its bulk is not very big but it contains a very large material owing to its carefully planned scheme and the many improved proofs. Authors writing in Russian played a definitive role in the development of the topic dealt with; their work is quoted here with exemplary completeness. Furthermore, the book is as up-to-date as possible; it contains references up to 1970. It is written in an informal, clear style; the reader is assumed to have a stable knowledge of the elements of group theory.

Let us, finally, give the list of chapters: 1. Fundamental Concepts in the Theory of Infinite Groups 2. Soluble and Nilpotent Groups. 3. Maximal and Minimal Conditions. 4. Finiteness

Conditions on Conjugates and Commutators. 5. Finiteness Conditions on the Subnormal Structure of a Group. 6. Generalized Nilpotent Groups. 7. Engel Groups. 8. Local Theorems and Generalized Soluble Groups. 9. Residually Finite Groups. 10. Some Topics in the Theory of Infinite Soluble Groups.

B. Csákány (Szeged)

S. Sakai, C^*-Algebras and W^*-Algebras (Ergebnisse der Mathematik und ihrer Grenzgebiete, Bd. 60), XII+256 pages, Berlin—Heidelberg—New York, Springer-Verlag, 1971.

The theory of C^*- and W^*-algebras has grown so tremendously in the last two decades, that it seems to be very unlikely that anybody would attempt to write a complete monograph on the subject. Sakai says in his book's preface that he has "no intention of giving a complete coverage" and his "selection is concentrated heavily on the topics with which" he has been "more or less concerned". Comparing Sakai's treatise with Dixmier's two classics, one finds that Sakai's work covers the major part of the material presented in "Les algèbres d'opérateurs dans l'espace hilbertien (Algèbres de von Neumann)" but it provides considerably less information on C^*-algebras than "Les C^*-algèbres et leurs représentations". It also contains very important more recent results which were obtained after the publications of Dixmier's books. Among these are the commutation theorem of tensor products, decompositions of states, derivations of C^*- and W^*-algebras, uncountable families of type II_1, II_∞, and III factors and examples of global type II_1, II_∞, and III W^*-algebras.

Sakai's exposition is modern and concise. He defines W^*-algebra as a C^*-algebra that has a Banach-space predual and builds up the fundamentals of the theory in an abstract way. He introduces the notion of trace after the classification of W^*-algebras and he classifies W^*-algebras by relying on the comparability theorem of projections. The reduction theory of von Neumann is elaborated by using the recent decomposition theory of states. At the end of his book the author constructs uncountable families of type II_1, II_∞ and III factors and shows that von Neumann's reduction theory is not trivial.

Sakai's work contains four chapters: General theory; Classification of W^*-algebras; Decomposition theory; Special topics. The chapters are diveded into sections. Almost every section has a list of references and most of them have "concluding remarks". The book contains no exercises; however, some sections indicate unsolved problems and some "concluding remarks" give suggestions for research. It is a very valuable contribution to the literature on the subject.

J. Szűcs (Szeged)

K. Sarkady—I. Vincze, Mathematical Methods of Statistical Quality Control, 415 pages, Budapest, Akadémiai Kiadó, 1974.

The book consists of three chapters. The first one is a 12 page introduction. The second one, which is 215 pages long, contains the systematic exposition of the fundamentals of probability theory and mathematical statistics. The third, 147 pages, presents the methods of statistical quality control. In this chapter the following topics are considered: Statistical methods in the control of production processes, Process control by variables, Control by attributes, The choice of the interval between two consecutive controls, Acceptance sampling, Sampling by attributes, Sampling inspection by variables, Sequential sampling, Acceptance plans and production as a stochastic process, Reliability theory. The Appendix at the end of the book contains numerous useful tables. The book's exposition is simple, it avoids measure theoretic notions and does not provide proofs for the results considered, just as the earlier book of I. Vincze, "Mathematische Statistik mit industriellen Anwendungen" (Budapest, Akadémiai Kiadó, 1971). The book can be useful first of all for those who want to study or apply the basic results of mathematical statistics and those of statistical quality control.

K. Tandori (Szeged)

B. Segre, Some properties of differentiable varieties and transformations (Ergebnisse der Mathematik, und ihrer Grenzgebiete, Bd. 13), Second edition, IX+195 pages, Berlin—Heidelberg—New York, Springer-Verlag, 1971.

The first edition of the book appeared in 1957 and it was a summary of a series of very new results as well as a good guide to the theory of several branches of mathematics whose chief characteristic is that of establishing suggestive and sometimes unforeseen relations between apparently diverse subjects.

The basic topics are investigations on differential, topological and projective invariants of differentiable and analytic point transformations between two portions of two Euclidean spaces. Some of these invariants are related to a class of important systems of curves, the study of which permits to extend in certain directions the projective-differential theory of surfaces, and it is shown how the theory of residues of analytic functions can be employed to the study of differential properties of analytic curves. Among many other interesting related investigations and results some aspects of linear partial differential equations are treated especially in Chapter IX added to the first edition.

At the end of each chapter there are brief "Historical Notes and Bibliography" which contain sufficient references to enable the reader to pursue his study further on this field.

T. Matolcsi (Szeged)