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BOOK REVIEWS

DA PRATO, G., TUBARO, L. (editors) - *Control of partial differential equations*, Lecture notes in pure and applied mathematics, v. 165, Marcel Dekker, 1994, viii+279 p., ISBN 0-8247-9240-8.

The volume we review contains 19 papers presented at the IFIP WG 7.2 International Conference held in Trento (Italy) in January 1993. The purpose of the conference was the optimal control, a very developed and ramified domain, where pure mathematics interact with the applied mathematics. The subjects approached at the conference are including problems of boundary control, Riccati equations, Hamilton–Jacobi–Bellman equations, Navier–Stokes equations, problems of stochastic control, singular control, optimization of the forms. The book is useful to all specialists in the domain.

RUBIO, J.E. – *Optimization and nonstandard analysis*, Monographs and textbooks in pure and applied mathematics, v. 184, Marcel Dekker, 1994, x+356 p., ISBN 0-8247-9281-5.

This book put together the author's results concerning the relation between the optimization and the nonstandard analysis. In the first chapter, the reader is introduced in the domain of the optimization – problems and difficulties. The first concepts of nonstandard analysis are also introduced here. Other concepts and applications are presented in the following chapter. The theory of measure and the optimizations presented by nonstandard methods are the subjects of the third chapter. In the fourth chapter the theory of linear spaces is presented. The nonstandard variant of the variational principle of Ekeland is presented and applications of variational problems and optimal control problems are given. So, a nonstandard maximal principle is presented as an application. In the fifth chapter the homogeneous control systems are studied, especially the nonlinear equation of the diffusion. The theory of the existence as well as the numerical estimation of the optimal control are presented in detail. Finally, the last chapter introduces the nonstandard theory of distributions and applications in the optimal control theory. There are two appendix: the first presents a set of exercises and the second presents an extensive bibliographical list setted on subjects. The book is useful to the specialists in this domain.

EBERLEIN, E., HAHN, M., TALAGRAND, M. (editors) – *High Dimensional Probability.* Progress in Probability, vol. 43, Birkhäuser Verlag, Basel, Boston, Berlin, 1998, viii+330 p., ISBN 3-7643-5867-X, 0-8176-5867-X.

The volume contains 20 papers presented to the conference "High dimension probability", held in August 1996, at the Mathematical Researchers Institute of Oberwolfach. This conference was preceeded by a series of scientific reunions dedicated to the probabilities on Banach spaces. The reason of the name of "high dimension" probability consists in the fact that, e.g., the set of times of a Gaussian process is no longer a subset of an Euclidean space, of at most 3 dimension, but a subset of a metric space, having the metric induced by the random process. From the problems treated in the papers of this volume we remind: the consistency of M–estimations, strong approximations of local empiric processes, empiric and regular central limit theory for interchangeable random variables, law convergence of random elements and, in particular, of aleatory sets, inequalities for Gaussian measure on Banach spaces, asimptotic of the spectral projections of some random matrix approximating integral operators, the best limits of Doob type for the maximum of the trajectories of Brownian motion. The papers are remarkable by a high generalization and abstractization degree and could interest specialists of random processes and mathematical statistics.

Elena Nenciu

HINTIKKA, J. – *Language, Truth and Logic in Mathematics*, Kluwer Academic Publishers, Dordrecht, Boston, London, ISBN 0-7923-4766-8.

In the present volume twelve essays of the author (three of them are written in collaboration with Gabriel Sandu and one is written in collaboration with Arto Mutanen) are reunited and reprinted with the aim to open a radically new (global) perspective on the foundation of mathematics. The new constructive possibilities are given after a scruting of the fundamental concepts of mathematics, which shows that some of these concepts need re–examination and re–definition. For instance, the quantification theory, the formalism, the contrast between standard and non–standard interpretations of higher–order logics, the concepts of computability and of parallel processing, the idea of the completeness of a mathematical system and the notion of a model in first–order logic are analysed from a point of view which is not primarily critical, but tipically open up new constructive possibilities.

The publication of this book is a benefical initiative which will be appreciated by philophers, logicians and mathematicians. This book would be, also, of interest to research libraries and university libraries.

I.Tofan

GRÄTZER, G. – *General Lattice Theory,* second edition, Birkhäuser Verlag, Basel, Boston, Berlin, 1998, ISBN 3-7643-5239-6 (Basel...), ISBN 0-8176-5239-6 (Boston).

The main goal of this volume is to present the most important results and research methods of lattice theory (and to offer the background in lattice theory so necessary in allied fields). Chapter I gives a concise development of the basic concepts of lattice theory. A special feature of this chapter is a detailed development of free lattices generated by a partial lattice over an arbitrary variety. Chapter II develops distributive lattices including representations theorems, congruences, Boolean algebras, distributive lattices with pseudocomplementation. In chapter III the congruences and ideals of general lattices are studied. After giving the basic facts concerning modular and semimodular lattices, chapter IV investigates the geometric lattices, in particular direct decompositions and geometric lattices arising out of geometries and graphs. Chapter V and VI deal with varieties of lattices and, respectively, free lattices. About 900 exercices help the beginner to learn the basic results and important techniques. This present edition contains also a brief review of the major results of the last 20 years and solutions of the problems proposed in the first edition. It was supplemented also by appendices concerning distributive lattices and duality (Brian A. Daveyand Hillary A. Priestly), continuous geometries (Friederich Wehrung), projective lattice geometries (Marcus Greferath and Stefan E. Schmidt), varieties (P. Jopsen and Henri Rose), free lattices (Ralph Freese), formal concept analysis (Berhard Ganter and Rudolph Wille) and congruence lattices (Thomas Schmidt in cooperation with the author).

Experts as well as students will find here an excelent monograph that introduces the general reader to lattice theory and brings the expert up to date on the most recent developments.

I. Tofan

ELIAS, J., GIRAL, J.M., MIRÓ-ROIG , R.M., ZARZUELA, S. (editors) – *Six lectures on commutative algebra*, Progress in Mathematics, vol. 166, Birkhäuser Verlag, Basel, Boston, Berlin, 1998; ISBN 3-7643-5951-X (Basel...), ISBN 0-8176-5951-X (Boston).

This volume contains texts grown out of the six series of lectures given by the authors in the Summer School in Commutative Algebra at the Centre de Recerca Matemàtica, Institut d'Estudis Catalans, July 15–26, 1996.

1 *Infinite Free Resolutions* (Luchezar L. Avramov): these notes describe results and techniques for finite modules over a commutative noetherian ring for studying the infinite free resolutions (a free resolution of a module extends a presentation in terms of generators and relations, by choosing for the relations, then generators for the relations between relations, *ad infinitum*).

2 *Generic Initial Ideals* (Mark L. Green): the reader will find an interesting field of study where ideas from commutative algebra, geometry and combinatorics meet as equal and work together in harmony.

3 *Thight Closure, Parameter Ideals and Geometry* (Craig Huneke): the topic of these notes is tight closure of parameter ideals in positive characteristic. In this frame the notion of tight closure is connected to several more classical themes in both algebra and geometry. A large area of problems ("where does tight closure come from", the existence of test elements, the test ideal, a.s.o.) is treated.

4 *On the Use of Local Cohomology in Algebra and Geometry* (Peter Schenzel): the author's aim is to present several pictures about the powerful tool of local cohomology in different fields of commutative algebra and algebraic geometry. The reader may feel a challenge to continue with the study of local cohomology in his own field.

5 *Problems and Results on Hilbert Functions of Graded Algebras* (Giuseppe Valla): this paper is mainly devoted to the problem of characterizing the possible numerical functions which are the Hilbert functions of the some graded algebras with special properties, e.g. reduced, Cohen–Macauley or Gorenstein, to the problems related to the Hilbert function of a scheme of fat points in projective spaces. A list of conjectures recently stated by Eisenbud, Green, Harris is also given.

6 *Cohomological Degrees of Graded Modules* (Wolmer V. Vasconcelos): the main use of the notions of arithmetic degree, geometric degree, degree of nilpotency is to make predictions about the outcome of carrying out Noether normalisation on a graded algebra and as numerical predictors of properties of an ideal as seen from its primary decompo-

sition.

The papers of this volume contain materials that have not been presented systematically before.

Research workers as well as graduate students in commutative algebra and related areas will find here a useful overwiew (given by renowned scientists) of the field and its recent developments.

I. Tofan

GERHARD SAAD and MOMME JOHS THOMSEN (editors) – *Nearrings, Nearfields and K–Loops*, Proceedings of the Conference on Nearrings and Nearfields, Hamburg, Germany, July 30 – August 6, 1995. Kluwer Academic Publishers, Dordrecht, Boston, London, 1997, xiii+444 p., ISBN 0-7923-4799-4.

This volume is the seventh proceedings of a nearring conference. The 14th International Conference on Nearrings and Nearfields held in Hamburg at the Universität der Bundeswehr Hamburg between July 30 and August 6, 1995.

During the last sixty years, the theory of nearrings and related algebraic structure (for example nearfields, nearmodules, N-groups, nearalgebras, semi(near)rings and infranearrings) has developed as an extensive branch of algebra with its own features. In its position between groups and rings, this branch of algebra has not only connections to these two well–known areas of algebra, but it also has close relationships with many other mathematical domains.

This Proceedings contains five invited lectures, followed by thirty contributed papers, and all of them have been refered. For information purpose, we list here the titles: H. Karzel – *From nearrings and nearfields to K-loops*; K. Kaarli – *On non–zerosymmetric near–rings with minimum condition*; C.J. Manson – *Nearrings of homogeneous functions, P^3*; S.D. Scott – *The structure of Ω–groups;* H. Wähling – *Ordered nearfields;* J. Alison & L. Zhongkui – *Strongly idempotent seminearrings and their prime ideal spaces;* E. Aichinger – *A note on simple composition rings;* E. Aichinger & C. Nöbauer – *The cardinalities of the endomorphisms nearrings $I(G), A(G)$ and $E(G)$ for all gropups G with $|G| \leq 31$*; S.W. Bagley – *Polynomial nearring: Polynomials with coefficients from a nearring;* H.E. Bell – *On derivations in nearrings*, II; G.F. Birkeumeier, H.E. Heatherly & G.F. Pilz – *Nearrings and rings generated by homomorphisms of groups;* G.L. Booth & N.J. Groenewald – *Special radicals of Ω-groups;* S.G. Botha – *Quasi-ideals and bi–ideals in categories;* T. Boykett – *Seminearrings of polynomials over* *semifields: A note on Blackett's Frederictonn paper;* R.A. Eggetsberger – *Circles and their interior points from field generated Ferrero pairs;* R.L. Fray – *On direct decompositions in group near–rings:* C.M. Gabriel – *On involution sets induced by neardomains;* M.J. Groenwald – *Superprime near-rings;* H.E. Heatherly, E.K.S. Lee & R. Wiegandt – *Involutions on universal algebras;* H. Hotje – *Fibered incidence loops by neardomains;* H. Kiechle & A. Konrad – *The structure group of certain K-loops*; J. Krempa – *Some examples of indecomposable modules;* A. Kreutzer – *Central Bol loops;* B. Lockhart – *Products on products on groups;* K.D. Magill – *Topological* $\mathbb{N}$-*groups where the nearrings are real nearrings;* S.J. Mahmood & M.F. Massouri – *Tensor product of near–ring modules;* J.D.P. Meldrum – *Nilpotence and endomorphism near–rings;* D. Niewieczerzal – *Distributively generated subrings of homogeneous maps;* Q.N. Petersen & S. Veldsman – *Composition nearrings;* G.F. Pilz – *Categories of near–rings;* G. Saad, S.A. Syskin & M.J. Thomsen – *The inner automorphism nearrings $I(G)$ on all nonabelian group G of order $|G| \leq 100$;* J. Schiftar & H. Zeitler – *Special quasigroups and Steiner systems;* A. Speegle – *On the non–simplicity of a subring of $M(G)$*; M. Ştefănescu – *Near–rings in connection with non–abelian cohomology of groups;* S. Veldsman – *On the salient properties of near–ring radicals.* This volume is dedicated to the memory of James R. Clay.

V.M. Gontineac