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QUARTERLY OF APPLIED MATHEMATICS

The QUARTERLY prints original papers in applied mathematics which have an intimate connection with applications. It is expected that each paper will be of a high scientific standard; that the presentation will be of such character that the paper can be easily read by those to whom it would be of interest; and that the mathematical argument, judged by the standard of the field of application, will be of an advanced character.

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SUGGESTIONS CONCERNING THE PREPARATION OF MANUSCRIPTS FOR THE QUARTERLY OF APPLIED MATHEMATICS

The editors will appreciate the authors' cooperation in taking note of the following directions for the preparation of manuscripts. These directions have been drawn up with a view toward eliminating unnecessary correspondence, avoiding the return of papers for changes, and reducing the charges made for "author's corrections."

Manuscripts: Manuscripts should be typewritten double-spaced on one side only. Marginal instructions to the typesetter should be written in pencil to distinguish them clearly from the body of the text. The author should keep a complete copy.

The papers should be submitted in final form. Only typographical errors should be corrected in proof; composition charges for any major deviations from the manuscript will be passed on to the author.

Titles: The title should be brief but express adequately the subject of the paper. The name and initials of the author should be written as he/she prefers; all titles and degrees or honors will be omitted. The name of the organization with which the author is associated should be given in a separate line following his/her name.

Mathematical Work: As far as possible, formulas should be typewritten; Greek letters and other symbols not available on the average typewriter should be inserted using either instant lettering or by careful insertion in ink. Manuscripts containing pencilled material other than marginal instructions to the typesetter will not be accepted.

The difference between capital and lower-case letters should be clearly shown; care should be taken to avoid confusion between zero (0) and the letter O, between the numeral one (1), the letter l and the prime ($'$), between alpha and a, kappa and k, mu and u, nu and v, eta and n.

The level of subscripts, exponents, subscripts to subscripts, and exponents to exponents should be clearly indicated.

Single embellishments over individual letters are allowed; the only embellishment allowed above groups of letters is the overbar.

Double embellishments are not allowed. These may be replaced by superscripts following the symbols.

Complicated exponents and subscripts should be avoided. Any complicated expression that recurs frequently should be represented by a special symbol.

For exponentials with lengthy or complicated exponents the symbol exp should be used, particularly if such exponentials appear in the body of the text. Thus,

$$\exp[(a^2 + b^2)^{1/2}] \text{ is preferable to } e^{(a^2+b^2)^{1/2}}.$$

Fractions in the body of the text and fractions occurring in the numerators or denominators of fractions should be written with the solidus. Thus,

$$\frac{\cos(x/2b)}{\cos(a/2b)} \text{ is preferable to } \frac{\cos\frac{x}{2b}}{\cos\frac{a}{2b}}.$$

In many instances the use of negative exponents permits saving of space. Thus,

$$\int u^{-1} \sin u \, du \text{ is preferable to } \int \frac{\sin u}{u} \, du.$$

Whereas the intended grouping of symbols in handwritten formulas can be made clear by slight variations in spacing, this procedure is not acceptable in typeset formulas. To avoid misunderstanding, the order of symbols should therefore be carefully considered. Thus,

$$(a + bx)\cos t \text{ is preferable to } \cos t(a + bx).$$

Figures: Figures should be drawn in black ink with clean, unbroken lines; do not use ball point pen. The paper should be of a nonabsorbant quality so that the ink does not spread and produce fuzzy lines. If the figures are intended for reduction, they should be drawn with heavy enough lines so that they do not become flimsy at the desired reduction. The notation should be of professional quality and in proportion for the expected reduction size. Figures which are unsuitable for reproduction will be returned to the author for redrawing. Legends accompanying figures should be written on a separate sheet.

Bibliography: References should be grouped together in a Bibliography at the end of the manuscript. References in text to the Bibliography should be made by numerals between square brackets.

The following examples show the desired arrangements: (*for books* S. Timoshenko, *Strength of materials*, vol. 2, Macmillan and Co., London, 1931, p. 237; *for periodicals*— Lord Rayleigh, *On the flow of viscous liquids, especially in three dimensions*, Phil. Mag. (5) 36, 354-372 (1893)). Note that the number of the series is not separated by commas from the name of the periodical or the number of the volume.

Authors' initials should precede their names rather than follow them.

In quoted titles of books or papers, capital letters should be used only where the language requires this. Thus, *On the flow of viscous fluids* is preferable to *On the Flow of Viscous Fluids*, but the corresponding German title would have to be rendered as *Über die Stromung zaher Flüssigkeiten*.

Titles of books or papers should be quoted in the original language (with an English translation added in parentheses, if this seems desirable), but only English abbreviations should be used for bibliographical details such as ed., vol., no., chap., p.

Footnotes: As far as possible, footnotes should be avoided. Footnotes containing mathematical formulas are not acceptable.

Abbreviations: Much space can be saved by the use of standard abbreviations such as Eq., Eqs., Fig., Sec., Art., etc. These should be used, however, only if they are followed by a reference number. Thus, "Eq. (25)" is acceptable but not "the preceding Eq." Moreover, if any one of these terms occurs as the first word of a sentence, it should be spelled out.

Special abbreviations should be avoided. Thus "boundary conditions" should always be spelled out and not be abbreviated as "b.c." even if this special abbreviation is defined somewhere in the text.

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0033-569X(199509)53:3;1-5

Algebra, Volume 3. Second Edition. By P. M. Cohn. John Wiley & Sons, 1991. xii+474 pp., $115.00.

This is the last volume in the three-volume treatise and contains the following chapters: 1. Universal algebra; 2. Multilinear algebra; 3. Homological algebra; 4. Further group theory; 5. Further field theory; 6. Algebras; 7. Central simple algebras; 8. Quadratic forms and ordered fields; 9. Noetherian rings and polynomial identities; 10. Rings without finiteness assumptions; 11. Skew fields. There are numerous exercises of varying difficulty.

Robust Stabilization in the Gap-topology. By L. C. G. J. M. Habets. Springer-Verlag, 1991. 126 pp., $25.00.

This is volume 150 in the series *Lecture Notes in Control and Information Sciences.* It can be divided into three parts. In the first part, the notions of robust stabilization and the gap-topology are introduced. In the second part, most of the theory is developed. In the third part, algorithms are developed to compute a solution to this problem for systems in state-space form.

Topics in Noncommutative Geometry. By Yuri I. Manin. Princeton University Press, 1991. vii+164 pp., $35.00.

This book was prepared for the Milton Brockett Porter Lectures given at Rice University in the fall of 1989 by the author, who is Professor of Algebra at Moscow University, but contain more material than the lectures. Chapter 1 is an overview that gives the sources of the subject and its relationship to modern physics. The other chapters are more specialized; 2. Supersymmetric algebraic curves; 3. Flag superspaces and Schubert supercells; 4. Quantum groups as symmetries of quantum spaces.

Foundations of Coding—Theory and Applications of Error-Correcting Codes with an Introduction to Cryptography and Information Theory. By Jirí Adámek. John Wiley & Sons, 1991. xiii+336 pp., $49.95.

This book is devoted to constructions of (i) error-correcting codes; (ii) secrecy codes; (iii) codes used in data compression, with stress on the first direction: a number of important classes of error-detecting and error-correcting codes are introduced, and their decoding methods presented. The deep background in modern algebra required by some of these is provided in the text. The author's aim is to make the reader appreciate both the beauty of the subject and the scope of modern applications. The book evolved from a series of lectures given at the Czech Technical University in Prague in 1985–1990.

Control Theory in the Plane. By O. Hájek. Springer-Verlag, 1991. x+269 pp., $42.00.

This book is an introduction to the study of control systems governed by ordinary differential equations, with special reference to the two-dimensional phase plane as state space. These systems are continuous, deterministic, evolving within finite-dimensional spaces, and with control subject to a priori bounds. Part I (Control systems in Euclidean Spaces) comprises the first three chapters, Part II (Control Systems in the Plane) the last four.

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Fractals—Endlessly Repeated Geometrical Figures. By Hans Lauwerier, translated by Sophia Gill-Hoffstädt. Princeton University Press, 1991. xiv+203 pp.

This beautifully illustrated monograph was first published in Dutch in 1987. It has been written for a wide audience. The background information includes some mathematics, but the book can be enjoyed without it. Having access to a personal computer would help, but is not necessary, for reading the book—relevant programs (in TURBO BASIC) for generating the pictures are given in an appendix. Chapter headings: 1. Counting and number systems; 2. Numbers and points; 3. Meanders and fractals; 4. Spirals, trees and stars; 5. The analysis of a fractal; 6. Chance in fractals; 7. Poincaré, Julia, Mandelbrot; 8. Making your own fractals.

Mixed and Hybrid Finite Element Methods. By Franco Brezzi and Michel Fortin. Springer-Verlag, 1991. ix+350 pp., $59.00.

The presentation of the subject is built around a few classical examples (e.g. Dirichlet's problem, Stokes' problem, linear elasticity, etc.), which are sketched in chapter 1 and basic methods to approximate them are presented in chapter 4, following the general theory of chapter 2 and using finite element spaces of chapter 3. Those four chapters are the essential part of the book. Chapter 5 presents mixed approximations of Dirichlet's problem and analyses, chapter 6 deals with Stokes' problem and chapter 7 with linear elasticity and the Mindlin-Reissner plate model.

Exact Confidence Bounds when Sampling from Small Finite Universes—An Easy Reference Based on the Hypergeometric Distribution. By Tommy Wright. Springer-Verlag, 1991. xvi+430 pp., $54.00.

This is volume 66 of *Lecture Notes in Statistics.* It considers the following problem: assume a finite set of N units where A of the units have a particular attribute, and N is known whilst the value of A is not. If a sample of size n is selected randomly and a of the units in the sample have the particular attribute, what can be said about the unknown value of A? The book focuses on confidence interval estimation of A. It is its purpose to provide a complete and elementary development of the details behind the exact confidence bounds for A and to provide an extensive table of optimal upper and lower bounds that is easy to understand and use. It is primarily intended to be a quick and easy reference for a large group of users. However, the volume is also instructive and can be used as a supplement to courses in sampling techniques.

Mathematical Structures in Field Theories, Proceedings, Seminar 1986–1987. Stichting Mathematisch Centrum, Amsterdam, 1990. iii+169 pp., Dfl. 48.00.

This is volume CWI Syllabus 26, and covers the greater part of the lectures presented in the seminar. The authors are G. G. A. Bäuerle, P. J. M. Bongaarts, S. J. L. van Eijndhoven, J. de Graaf, J. W. van Holten and J. J. Seidel. There are six lectures. The emphasis in the first three lies on the mathematics, e.g., the first contains a mathematical interpretation of Dirac's formalism. Three lectures relate to supersymmetric field theory.

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Theory of Orlicz Spaces. By M. M. Rao and Z. D. Ren. Marcel Dekker, 1991. 472 pp., $145.00 ($55.00 on orders of five or more classroom copies).

This is volume 146 in *Pure and Applied Mathematics: A Series of Monographs and Textbooks.* The first seven chapters contain the fundamental theory of Orlicz spaces and the last three chapters show the directions in which current research is progressing. The subject is introduced through the classical de la Vallée Poussin criterion of uniform integrability of functions as a motivating step and then various types of Young functions are classified. Chapter headings: 1. Introduction and preliminaries; 2. Some classes of Young functions; 3. Orlicz function spaces; 4. Linear functionals and weak topologies; 5. Comparison of Orlicz spaces; 6. Analysis of linear operators; 7. Geometry and smoothness; 8. Orlicz spaces based on sets of measures; 9. Some related function spaces; 10. Generalized Orlicz spaces.

C^*-Algebras and Operator Theory. By Gerard J. Murphy. Academic Press, 1990. x+286 pp., $44.50.

This book is aimed at the beginning graduate student and the specialist in another area who wished to know the basics of the subject. The reader is assumed to have a good background in real and complex analysis, point set topology, measure theory, and elementary general functional analysis. The author has attempted to give an accessible exposition of the core material and to cover a number of topics having a high contemporary profile. Chapter headings: 1. Elementary spectral theory; 2. C^*-algebras and Hilbert space operators; 3. Ideals and positive functionals; 4. Von Neumann algebras; 5. Representations of C^*-algebras; 6. Direct limits and tensor products; 7. K-theory of C^*-algebras.

Stability of Stochastic Differential Equations with respect to Semimartingales. By X. Mao. Longman and John Wiley & Sons, 1991. 276 pp., $40.00.

This is volume 251 in the *Pitman Research Notes in Mathematics* series. It is its aim to systematize recent developments in the subject, including the author's own researches. Some other features of the monograph are: it demonstrates the manifestations of the general Lyapunov method by showing how this technique can be adapted to study entirely different systems and various stabilities, particularly almost sure stability; and it treats the theory of a variety of Lebesgue-Stieltjes integral inequalities.

Fixed Point Theory and Applications. Edited by M. A. Théra and J.-B. Baillon. Longman and John Wiley & Sons, 1991. 465 pp., $49.00.

This is volume 252 in the *Pitman Research Notes in Mathematics* series. It consists of the proceedings of a conference held at the Centre International de Recontres Mathématiques, located on the campus of the University of Marseille-Luminy, June 5–9, 1989. The specific objective of the meeting was to promote active current research in the following areas: fixed points of multivalued mappings; topological methods; minimax theorems and abstract inequalities; applications to economics, differential equations, game theory, optimization; ordered structures. Most of the 39 contributions contained in this volume consist of written versions of talks given during the meeting; some others are related work by authors who were unable to attend the conference.

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Integral Equations and Applications. By C. Corduneanu. Cambridge University Press, 1991. ix+366 pp., $89.50.

This book is designed to serve both as a graduate textbook of integral equations and as a reference in the field and some of its applications. A reasonable background in real analysis, and some acquaintance with the introductory concepts of functional analysis, is assumed in the reader. Chapter headings: 1. Introduction to the theory of integral equations; 2. Function spaces, operators, fixed points and monotone mappings; 3. Basic theory of Volterra equations: integral and abstract; 4. Some special classes of integral and integrodifferential equations; 5. Integral equations in abstract spaces; 6. Some applications of integral and integrodifferential equations.

Semigroup Algebras. By Jan Okninski. Marcel Dekker, 1991. ix+357 pp., $99.75.

This is volume 138 in *Pure and Applied Mathematics: A Series of Monographs and Textbooks.* It is intended as the first attempt to gather and unify the results of the theory of noncommutative semigroup rings. Most of the material comes from the literature of the past 10 years, and several new results are included. The 25 chapters are divided into 5 parts: 1. Semigroups and their algebras; 2. Semigroup algebras of cancellative semigroups; 3. Finiteness conditions; 4. Semigroup algebra satisfying polynomial identities; 5. Problems.

Introduction to Linear Programming—Applications and Extensions. By Richard B. Darts. Marcel Dekker, 1991. 376 pp., $49.75.

This is volume 141 in *Pure and Applied Mathematics: A Series of Monographs and Textbooks.* The basic goal of the book is to teach linear programming and to give a clear, elementary introduction to the simplex method. An additional goal is to introduce, briefly, networks, dynamic programming, quadratic programming, and quadratic functions. Chapter headings: 1. Introduction to systems of linear equations and related properties of matrices; 2. Introduction to linear programming; 3. Elementary properties of the feasible set for an LP; 4. Introduction to the simplex method; 5. Topics in LP and extensions; 6. Duality; 7. Quadratic programming; 8. Minimizing a quadratic function; 9. Network algorithms.

Matrices and Vector Spaces. By William C. Brown. Marcel Dekker, 1991. 328 pp., $49.75.

This is volume 145 in *Pure and Applied Mathematics: A Series of Monographs and Textbooks.* It is designed as a textbook for a one-semester or two-quarter honors course in linear algebra at the junior level, for students who have a serious interest in mathematics.

Methods in Neuronal Modeling—From Synapses to Networks. Edited by Christof Koch and Idan Segev. The MIT Press, 1991. xii+526 pp., $22.95.

This is the MIT Press paperback edition of the book first published in 1988.

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Integral Equations and Inverse Problems. Edited by V. Petrov and R. Lazarov. Longman and John Wiley & Sons, 1991. 285 pp., $40.00.

This is volume 235 in the *Pitman Research Notes in Mathematics* series. The 34 papers in it constitute the proceedings of an international conference held September 18–23, 1989 in Varna, Bulgaria. The conference's aim was to bridge the gap between the mathematical and applied aspects of the field, and this is reflected in these proceedings.

Inverse Problems and Imaging. Edited by G. F. Roach. Longman and John Wiley & Sons, 1991. 263 pp., $40.00.

This is volume 245 in the *Pitman Research Notes in Mathematics* series. The 12 papers in this volume constitute the proceedings of a meeting held at Ross Priory, University of Strathclyde. They concern tomography, scattering and other inverse problems.

Stochastic Analysis and Related Topics II. Edited by H. Korezlioglu and A. S. Ustunel. Springer-Verlag, 1990. 268 pp., $29.00.

These are the Proceedings of the Second Workshop on the subject, held in Silivri, Turkey, July 18–30, 1988. Included are the texts of two invited lectures on Wiener functional integration theory by S. Watanabe, and stochastic differential equations by E. Pasdoux, and nine contributed papers.

Representation of Lie Groups and Related Topics. Edited by A. M. Vershik and D. P. Zhelobenko. Gordon and Breach Science Publishers, 1990. xiii+557 pp., $294.00 (List Price), $118.00 (Science and Arts Society Price—for details contact publisher).

This translation from the Russian is volume 7 in the series *Advanced Studies in Contemporary Mathematics.* It contains eight substantial articles on the representation of infinite-dimensional Lie groups and algebras and allied problems. The authors are actively working in this field in Moscow and Leningrad and the articles reflect a major part of this problem area as it is being studied in the USSR. In addition to the editors, the authors are: S. V. Kerov, I. M. Gel′fand, M. I. Graev, R. S. Ismagilov, Yu. A. Neretin, G. I. Ol′shankii, B. L. Feigin, and D. B. Fuchs.

Matrices: Methods and Applications. By Stephen Barnett. Oxford University Press, 1990. xvi+450 pp.

This is a volume in the *Oxford Applied Mathematics and Computing Science Series.* The first seven chapters provide a first course on matrices, including applications, and the last seven chapters consist of more advanced topics not easily found in textbooks: 1. How matrices arise; 2. Basic algebra of matrices; 3. Unique solution of linear equations; 4. Determinant and inverse; 5. Rank, non-unique solution of equations, and applications; 6. Eigenvalues and eigenvectors; 7. Quadratic and hermitian forms; 8. Canonical forms; 9. Matrix functions; 10. Generalized inverses; 11. Polynomials, stability, and matrix equations; 12. Polynomial and rational matrices; 13. Patterned matrices; 14. Miscellaneous topics.