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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,

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

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

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

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.

CONTENTS

Infinite-Dimensional Optimization and Convexity. By Ivar Ekeland and Thomas Turnbull. The University of Chicago Press, 1983. 161 pp.

The aim of these lecture notes is to introduce students and researchers with various backgrounds to the modern theory and applications of infinite-dimensional optimization, taking the calculus of variation as a basic example. The course on which the notes are based was concerned mainly with existence theory to investigate whether an optimal solution can be found to the problem of minimizing a functional over some feasible set, usually defined by constraints. There are three chapters on the Carathéodory approach, infinite-dimensional optimization, and duality theory, respectively.

Differential Geometric Methods in Theoretical Physics. By G. Denardo and H. D. Doebner. World Scientific, 1983. 322 pp. $33.00.

These are the proceedings of a conference held at the International Centre for Theoretical Physics, Trieste, June 30–July 3, 1981. There are four review lectures on supergravity, unified gravity theories, Einstein and the geometrization of physics and classical scattering theory, respectively, and lectures and seminar proceedings under the four headings: (i) differential operators on manifolds and quantization methods, (ii) particle physics and space-time geometry, (iii) quantum field theories and gauge theories, and (iv) gravity.

Generalized Linear Models. By J. Nelder and P. McCullagh. Chapman & Hall, Methuen, Inc., 1983. 238 pp. $29.95.

This is a volume in the series "Monographs on Statistics and Applied Probability." This monograph deals with a class of statistical models that generalizes classical linear models to include many other models that have been found useful in statistical analysis. These other models include log-linear models for the analysis of data in the form of counts, probit and logit models for data in the form of proportions (ratios of counts), and models for continuous data with constant proportional standard error. In addition, important types of models for survival analysis are covered by the class. An important aspect of the generalization is the presence in all the models of a linear predictor based on a linear combination of explanatory or stimulus variables. The variables may be continuous or categorical (or indeed mixtures of the two), and the existence of the linear predictor means that the concepts of classical regression and analysis-of-variance models, insofar as they refer to the estimation of parameters in a linear predictor, carry across directly to the wider class of models. In particular, the ideas underlying factorial models, including those of additivity, interaction, polynomial contrasts, aliasing, etc., all appear in the wider context. Generalized linear models have a common algorithm for the estimation of parameters by maximum likelihood; this uses weighted least squares with an adjusted dependent variate, and does not require preliminary guesses to be made of the parameter values. The book is aimed at applied statisticians and postgraduate students in statistics, but will also be useful to undergraduates and to numerate biologists.

Notes on Economic Time Series Analysis: System Theoretic Perspectives. By M. Aoki. Springer-Verlag, 1983. 250 pp. $17.00.

This is volume 220 of "Lecture Notes in Economics and Mathematical Systems." The author's aim is to present, in as self-contained a manner as possible, a body of results and techniques in systems theory that may be relevant and useful to economists interested in using time series in their research. Chapters 1 to 6 are preparatory to the main parts of the notes. Chapter headings: 1. Introduction; 2. The Notion of State; 3. Time-invariant Linear Dynamics; 4. Time Series Representation; 5. Equivalence of ARMA and State Space Models; 6. Decomposition of Data into Cyclical and Growth Components; 7. Prediction of Time Series; 8. Spectrum and Covariances; 9. Estimation of System Matrices: Initial Phase; 10. Innovation Processes; 11. Time Series from Intertemporal Optimization; 12. Identification; 13. Time Series from Rational Expectations Models; 14. Numerical Examples. There are also 18 appendices consisting of brief but mostly self-contained accounts of the mathematical results used in the main body.

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A First Course in Probability. By Sheldon Ross. Macmillan Publishing Company, 1984. 387 pp. $29.95.

This is a second edition of a text first published in 1976. Chapter headings: 1. Combinatorial Analysis; 2. Axioms of Probability; 3. Conditional Probability and Independence; 4. Random Variables; 5. Continuous Random Variables; 6. Jointly Distributed Random Variables; 7. Expectation; 8. Limit Theorems; 9. Additional Topics in Probability.

Non-Linear Waves. By Lokenath Debnath. Cambridge University Press, 1983. 353 pp. $39.50.

This book had its origin in a NSF-CBMS regional research conference on nonlinear waves and integrable systems held at East Carolina University in June, 1982. It has been divided into three parts: 1. Nonlinear waves in fluids (seven chapters); 2. Nonlinear waves in plasmas (five chapters); 3. Solitons, inverse scattering transform, and nonlinear waves in physics (six chapters).

Paradigms and Programming with Pascal. By Derick Wood. Computer Science Press, 1984. 418 pp. $25.95.

This book is intended to be used as the basis of a second one-semester course in programming. It reinforces a methodical, disciplined, and planned approach to programming by deriving subprograms for a variety of problems while requiring little mathematical knowledge. It provides a fundamental programming methodology and uses many paradigms which offer a high level approach to problem solving. Each paradigm is illustrated with at least two problems, and numerous references for further reading and research are provided at the end of each chapter. The final chapter introduces a number of projects suitable as term projects. Contents: Part I, Pascal--a review; Part II, Programming--a methodology: a calendar problem; the Dutch national flag problem; the primality testing problem; long arithmetic; the user interface; efficient programming. Part III, Paradigms--a beginning: recursion: divide and conquer--key searching; divide and conquer--key sorting; indirection and linking; enumerative search and backtracking; heuristic search; sweeping search; Monte Carlo or probabilistic search. Part IV, Paradigms--A pursuit: more paradigms.

Quantitative System Performance: Computer System Analysis Using Queueing Network Models. By E. D. Lazowska, J. Zahorjan, G. S. Graham, and K. C. Sevcik. Prentice Hall Inc., 1984. 408 pp. $35.00.

This book is written for computer system performance analysts. Its goal is to teach them to apply queueing network models in their work, as tools to assist in answering the questions of cost and performance that arise throughout the life of a computer system. The authors believe that although queueing network models are not a panacea, they are the appropriate tool in a wide variety of computer system design and analysis applications. The book is divided into six parts. In Part I the authors provide background material: a general discussion of queueing network modelling, an overview of the way in which a modelling study is conducted, an introduction to the interesting performance quantities in computer systems and to certain relationships that must hold among them, and a discussion of the inputs and outputs of queueing network models. In Part II they present the techniques that are used to evaluate queueing network models—to obtain outputs such as utilizations, residence times, queue lengths, and throughputs from inputs such as workload intensities and service demands. In Part III they explore the need for detailed models of specific subsystems, and the construction of such models for memory, disk I/O, and processor subsystems. In Part IV they study the parameterization of queueing network models of existing systems, evolving systems, and proposed systems. In Part V they survey some nontraditional applications, such as the analysis of computer communication networks and database concurrency control mechanisms. They also examine the structure and use of queueing network modelling software packages. In Part VI, the appendices, they provide a case study in obtaining queueing network parameter values from system measurement data, and programs implementing the queueing network evaluation techniques described in Part II.

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Algorithmic Studies in Mass Storage Systems. By C. K. Wong. Computer Science Press, 1983. 400 pp. $32.95.

A major technological trend for large database systems has been the introduction of ever-larger mass storage systems. Tapes, disks and drums are classical examples of mass storage media. A new direction in mass storage development is represented by two-dimensional mass storage systems. With the maturity of magnetic bubble technology, more sophisticated, massive, multi-trillion-bit storage systems are not far in the future. While large in capacity, mass storage systems have in general relatively long access times. Since record access probabilities are usually not uniform, various algorithms have been devised to position the records to decrease the average access time. The first two chapters of this book are devoted mainly to such algorithmic studies in linear and two-dimensional mass storage systems. In the third chapter, the author views the bubble memory as more than a storage medium. He discusses different structures where routine operations, such as data rearrangement, sorting, searching, etc., can be done in the memory itself, freeing the CPU for more complicated tasks. The problems discussed in the book are combinatorial in nature. However, to solve them a wide variety of methods and techniques are employed. They include not only the discrete, combinatorial and probabilistic methods but also techniques such as variational calculus, vector majorization and discrete dynamic programming.

Probabilistic Engineering Design. By James N. Siddall. Marcel Dekker, Inc., 1983. 519 pp.

This is a volume in the series "Mechanical Engineering." It attempts to provide an engineer with the necessary background to apply probability concepts in design. A first course in probability and statistics would be useful for a user of the text but not essential. Chapter headings: 1. Introduction; 2. Concepts and Theorems of Probability; 3. Probability Distributions; 4. Moments of a Distribution; 5. Generation of Probability Density Functions; 6. Probabilistic Analysis; 7. Sequential Events; 8. Order Statistics and Extreme Values; 9. Prediction of Failure Mode Probabilities; 10. The Design Option Problem; 11. Reliability Theory; 12. Structural Reliability; 13. Probabilistic Optimization.

Complex Analysis and Applications, Second Edition. By William Derrick. Wadsworth International Group, 1984. 256 pp. $31.95.

This book is intended as a text for a one-term junior level introductory course in complex analysis. Chapter headings: 1. Analytic Functions; 2. Complex Integration; 3. Infinite Series; 4. Contour Integration; 5. Conformal Mappings; 6. Boundary Value and Initial Value Problems.

Ordinary Differential Equations and Operators. W. N. Everitt and R. T. Lewis, editors. Springer-Verlag, 1983. 521 pp. $

This is volume 1032 of "Lecture Notes in Mathematics," the proceedings of a symposium held at Dundee, Scotland, March–July 1982, and a tribute to F. V. Atkinson of the University of Toronto. There were 46 speakers.

Quasilinearization and the Identification Problem, Volume 2. By R. Bellman, R. Roth. World Scientific, 1983. 200 pp. $17.00 soft, $30.00 hard.

This is volume 2 in the "Series in Modern Applied Mathematics." Its purpose is to present an overview of the techniques of quasilinearization as they are applied to problems of system identification. While the ideas of quasilinearization were developed as a numerical tool for solving problems defined by nonlinear differential equations, these same ideas exhibit great potential for solving identification problems. As the authors show in this book, the quasilinear technique, when viewed as an identification procedure, has inherent advantages in establishing the interrelationships which exist in complex systems. It allows one to compute the solution to a system of differential equations by an iterative procedure which roughly parallels the Newton-Raphson technique for finding the roots of a nonlinear continuous function.

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Computation with Recurrence Relations. By Jet Wimp. Pitman Advanced Publishing Program, 1984. 292 pp. $50.00.

This is a volume in the series "Applicable Mathematics." The subject discussed in this book—although going back to the dawn of mathematics—has its modern origin in a technique expounded by J. C. P. Miller in an introduction to a 1952 table of Bessel functions. This technique was soon generalized to a host of computational problems. Roughly the first three-quarters of the book is devoted to linear problems, the remainder to the nonlinear case. Chapter headings: 1. Introduction; 2. General results on the forward stability of recursion relations; 3. First-order equations used in the backward direction: the Miller algorithm; 4. Second-order homogeneous equations: the Miller algorithm; 5. Applications of the Miller algorithm to the computation of special functions; 6. Second-order nonhomogeneous equations: the Olver algorithm; 7. Higher-order systems: homogeneous equations; 8. Higher-order systems (continued): the nonhomogeneous case; 9. The computation of ${}_3F_2(1)$; 10. Computations based on orthogonal polynomials; 11. Series solutions to ordinary differential equations; 12. Multidimensional recursion algorithms; general theory; 13. Two-dimensional algorithms; 14. Higher-dimensional algorithms.

Bifurcation Theory, Mechanics and Physics. C. P. Bruter, A. Aragnol, and A. Lichnerowicz, editors. D. Reidel Publishing Company, 1983. 381 pp. $

These are the proceedings of a colloquium on four aspects of the applications of mathematics: classical mechanics (Hamiltonian, Lagrangian, Poisson); quantum mechanics (the passage from the classical to the quantum approach and the problem of finding the explicit solution of Schrödinger's equation); fluid mechanics (problems involving partial differential equations); mathematical information theory. There are nineteen papers.

Geometry of Spatial Forms. By P. C. Gasson. John Wiley & Sons, 1983. 545 pp. $64.95.

This is a volume in the Ellis Horwood Series "Mathematics and Its Applications." It is the aim of the book to present all the most important branches of applicable geometry in a form best suited to the needs of shape design architects and engineers. Chapter headings: 1. Descriptive Geometry; 2. Analytic Geometry in Two Dimensions; 3. Analytic Geometry in Three Dimensions; 4. Determinants and Matrices; 5. Geometrical Transformations; 6. Polyhedral Structures; 7. Synthesis of Structure and Mechanism; 8. Classical Surfaces; 9. Lofted Lines; 10. Computational Geometry; 11. Computer Aided Graphics.

Numerical Solution of Differential Equations, Second Edition. By M. K. Jain. John Wiley & Sons, 1984. 693 pp. $34.95.

This is the second edition of a work first published in 1979 (see Quarterly of Applied Mathematics, vol. 38, p. 438). In it nearly all present day methods of solving differential equations are presented, and the convergence and stablity of the methods are derived. Chapters 1–4 deal with numerical methods for the initial and boundary value problems of ordinary differential equations, the adaptive methods developed to stabilize the numerical methods for a particular problem having been discussed in Chapters 2 and 3. The variable step methods to solve stiff differential equations of singular perturbation problems are presented in Chapters 3 and 4. The cubic spline and the compact implicit methods for the general second-order differential equations, and the convergence analysis for the eigenvalues of the Sturm-Liouville problem are discussed in Chapter 4. Chapters 5–7 are concerned with difference methods for the partial differential equations of three types, parabolic, hyperbolic and elliptic. The difference methods for time-dependent convection diffusion and cylindrical symmetric equations are given in Chapter 5. The system of conservation laws in one and two space dimensions is included in Chapter 6. The elliptic equations with convection terms have been presented in Chapter 7. Chapter 8 on "Finite Element Methods" has been enlarged to include in detail the solution of ordinary and partial differential equations. Also included in this edition are an additional 78 references and 120 problems.

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Notes in Pure and Applied Mathematics. Marcel Dekker, Inc., New York, 1982.

Volume 80: Nonlinear analysis and application, edited by S. P. Singh and J. H. Burry. 1982. 488 pp. $49.75.

In this book, an international panel of experts examines such topics as fixed point theory, approximation theory, and summability theory. It constitutes the proceedings of a conference held at Memorial University of Newfoundland in St. John's, June 1–3, 1981.

Volume 81: Volterra and functional differential equations, edited by K. B. Hannsgen, Terry L. Herdman, Harlan W. Stech, and Robert L. Wheeler. 1982. 352 pp. $45.00.

This volume contains the invited lectures presented at a conference held at Virginia Polytechnic Institute and State University June 10–13, 1981. There are eleven one-hour lectures and thirteen half-hour lectures.

Volume 82: Finite geometries, edited by N. L. Johnson, Michael J. Kallaher, Calvin T. Long. 1983. 472 pp. $55.00.

These are the proceedings of a conference in honor of T. G. Ostrom, held 7–11 April 1981 at Washington State University. It contains 38 lectures.

Volume 83: Functional analysis, holomorphy, and approximation theory, edited by Guido I. Zapata. 1983. 455 pp. $55.00.

This volume contains the proceedings of an international seminar held in Rio de Janeiro August 6–10, 1979. The participants came from Brasil, Canada, Chile, France, Peru, the United States, Venezuela, and West Germany. There are 19 papers.

Volume 84: Commutative algebra, edited by Silvio Greco and Giuseppe Valla. 1983. 351 pp. $47.50.

These are the proceedings of the Trento conference held at Villa Monastero, Trento, Italy, June 8–13, 1981. It contains 18 original research papers in commutative algebra and algebraic geometry.

Volume 85: Mathematical programming with data perturbations II, edited by Anthony V. Fiacco. 1983. 154 pp. $34.50.

The eight papers in this volume were selected from those presented to the second symposium for mathematical programming with data perturbation, held at the George Washington University, May 1980. Part I was published as Volume 73 of this series.

Applied mathematical analysis: vibration theory. Edited by G. F. Roach. Shiva Publishing Limited, Cheshire, England, 1982. 229 pp.

This is one of the University of Strathclyde Seminars. There are seventeen papers on various aspects of vibration and wave propagation.

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Plasticity of Metals at Finite Strain: Theory, Computation and Experiment. Edited by E. H. Lee and R. L. Mallett. Stanford University, Stanford, California, 1982. 758 pp.

These are the proceedings of a Research Workshop held at Stanford University on June 29, 30, July 1, 1981. The book is available gratis from Professor E. H. Lee at Rensselaer Polytechnic Institute as long as supplies last. It contains the texts of the papers and transcription of the extensive discussion which took place at the conference. There were six sessions: 1. Introductory lecture and contributions on constitutive relations (chaired by L. E. Malvern). The five papers were by: O. D. Sherby, S. de Jesus, T. Oyama and A. K. Miller; R. D. Krieg; J. C. Nagtegaal and J. E. de Jong; E. H. Lee; and A. K. Miller. 2. Macroscopic experiments, chaired by D. C. Drucker. The papers were by: S. S. Hecker, M. G. Stout and D. T. Eash; J. J. Jonas, C. R. Canova, S. C. Shrivastava and N. Christodoulou; A. Phillips. 3. Microscopic Mechanisms, chaired by J. W. Hutchinson. The four papers were by R. J. Asaro; K. S. Havner; O. Ruchmond; and S. Takagi. 4. Computation, chaired by T. J. R. Hughes. The four papers were by: A. Needleman; R. L. Mallett; V. Tvergaard; Y. F. Dafalias. Each paper at these four sessions was followed by a discussion transcribed in its entirety. The fifth and sixth sessions were entitled Assessment of problems and approaches; they consisted of four panels, corresponding to the above four sessions, and these panels were chaired respectively by E. T. Onat, L. Anad, J. W.. Hutchinson, and T. J. R. Hughes. They contain prepared remarks as well as transcriptions of the discussions at the panel meetings.

Markov Processes and Related Problems of Analysis: Selected Papers. (London Mathematical Society Lecture Note Series #54). By E. B. Dynkin. Cambridge University Press, Cambridge, England. 312 pp. $24.95

This is volume number 54 of the London Mathematical Society Lecture Note Series. Most of the papers by E. B. Dynkin printed here were published in Uspekhi Matematicheskih Nauk and translated into English in the Russian Mathematical Surveys. For this edition the author has revised the entire text of the English translation. There are nine papers dating from 1960 to 1980. The core consists of papers four through seven presenting a new approach to Markov processes, especially to the Martin boundary and the theory of duality.

Numerical Methods for Unconstrained Optimization and Nonlinear Equations. By J. E. Dennis, Jr. and Robert B. Schnabel. (Prentice-Hall Series in Computational Mathematics). Prentice-Hall, Inc., New Jersey, 1983. 370 pp. $28.95.

This is a textbook for graduate and upper-level undergraduate courses requiring only calculus and linear algebra. All algorithms covered are based on Newton's method. The heart of the book is the material on computational methods for multidimensional unconstrained optimization and nonlinear equation problems covered in Chapters 5–9. Chapter headings: 1. Introduction; 2. Nonlinear Problems in One Variable; 3. Numerical Linear Algebra Background; 4. Multivariable Calculus Background; 5. Newton's Method for Nonlinear Equations and Unconstrained Minimization; 6. Globally Convergent Modifications of Newton's Method; 7. Stopping, Scaling, and Testing; 8. Secant Methods for Systems of Nonlinear Equations; 9. Secant Methods for Unconstrained Minimization; 10. Nonlinear Least Squares; 11. Methods for Problems with Special Structure.

Very Large Scale Integration. Edited by Randal Bryant. (Proceedings on the Third CALTECH Conference on VLSI). Computer Science Press, Rockville, Maryland, 1983. 430 pp. $36.95.

The conference, held in March 1983, focused on the role of systematic methodologies, formalisms, and algorithms in all phases of the design, verification, and testing of very large scale integrated circuits. The book is divided into the seven following sections: Invited Papers; Circuit Timing; Routing and Interconnection; Formal System Models; Systems Building Blocks; Special-Purpose Chip Architectures; Silicon Compilation.

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Seminar on Stochastic Processes, 1982. E. Cinlar, K. L. Chung, and R. K. Getoor, editors. Birkhauser, 1983. 302 pp. $24.95.

This is a volume in the series "Progress in Probability and Statistics." It consists of about half of the papers presented during a seminar at Northwestern University in March 1982. There are texts of 13 papers.

Trees and Networks in Biological Models. By N. MacDonald. John Wiley & Sons, 1983. 221 pp. $39.95.

In this book, the author is interested in certain kinds of abstract networks in biological models, such as foodwebs in ecology and linked control loops in biochemistry. Therefore, in parts I and II of the work, he presents a review emphasizing the evaluation of numerical indices to characterize features of networks, and the effects of closed loops of interactions on stability of equilibrium and periodicity. In part III he provides a review of models and simulations of real trees and networks. Chapter headings: 1. Introduction: Real and Abstract Trees and Networks. Part I: Dominance, Predation, and Complexity: 2. Hierarchy in the Relationships of Individuals and Species; 3. The Trophic Structure of Foodwebs; 4. The Interval Structure of Foodwebs; 5. Complexity of Trees and Networks. Part II: Stability of Equilibrium States and of Periodic Behavior: 6. Stability and Complexity of Model Foodwebs; 7. Graphical Aspects of Local Stability Theory; Cycle Analysis; 8. Applications of Cycle Analysis; 9. Power Laws and Switching Functions; 10. Large Scale Clocked Switching Networks. Part III: Branching Structures: Description, Biophysics, and Simulation: 11. Branching Structures in Biology: Topology and Geometry; 12. Law and Order in Trees; 13. Branching Ratios, Branch Length Ratios, and Branch Diameter Ratios and Strahler Ordering; 14. The Lung as a Space-filling Tree; 15. Branching Diameter Ratios and Branching Angles: Biophysics; 16. Pipes, Bundles, and Horns: More Biophysics; 17. Simulating and Growth of Dendritic Trees; 18. The Mathematics of Tree Simulation: *L*-Systems; 19. Applications of *L*-Systems; 20. Simulation of Growth with Anastomosis: A Colonial Hydroid.

Lectures on Exponential Decay of Solutions of Second-Order Elliptic Equations: Bounds on Eigenfunctions of N-Body Schrödinger Operators. By Shmuel Agmon. Princeton University Press, Princeton, N. J., 1983. 118 pp. $10.50.

This is Mathematical Notes 29. The volume presents lectures given at the University of Virginia in the fall of 1980. The subject of these lectures is the phenomenon of exponential decay of solutions of second order elliptic equations in unbounded domains.

Almost periodic functions and differential equations. By B. M. Levitan & V. V. Zhikov. Cambridge University Press, Cambridge, England 1982. 207pp. $34.50.

This monograph, first published in Russian in 1978, contains an account of the contemporary state of the theory of almost periodic functions with values in a Banach space, and of the theory of almost periodic operator differential equations. Numerical almost periodic functions as well as ordinary differential equations are considered as special cases. The first five chapters are devoted to the general theory of almost periodic functions. In the remaining six, different approaches to the question of the solvability of linear and nonlinear operator differential equations in the class of almost periodic functions are presented. The authors also discuss other questions connected with operator differential equations, for example, the extension of the classical averaging principle of N. N. Bogolyubov to operator differential equations. Chapter headings: 1. Almost periodic functions in metric spaces; 2. Harmonic analysis of almost periodic functions; 3. Arithmetic properties of almost periods; 4. Generalization of the uniqueness theorem (*N*-almost periodic functions); 5. Weakly almost periodic functions; 6. A theorem concerning the integral and certain questions of harmonic analysis; 7. Stability in the sense of Lyapunov and almost periodicity; 8. Favard theory; 9. The method of monotonic operators; 10. Linear equations in a Banach space (questions of admissibility and dichotomy); 11. The averaging principle on the whole line for parabolic equations.

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La Regression: Nouveaux regards sur une ancienne méthode statistique. By R. Tomassone, E. Lesquoy, and C. Miller. (Actualités Scientifiques et Agronomiques, #13). Masson, Paris, 1983. 177 pp. 130F.

This is volume 13 in the series Actualités scientifiques et agronomiques de l'institut national de la recherche agronomique. Table of contents: Chapter 1. Simple linear regression; Chapter 2. Simple linear regression: detecting and correcting deviations from the model; Chapter 3. Multiple linear regression; Chapter 4. Multiple linear regression: qualitative variables as regressors; Chapter 5. Nonlinear regression; Chapter 6. Specific problems related to multiple linear regression.

Optimization and Nonsmooth Analysis. By Frank H. Clarke. John Wiley & Sons, 1983. 290 pp. $34.95.

This is a volume in the Canadian Mathematical Society "Series of Monographs and Advanced Texts." It develops a general theory of nonsmooth analysis and geometry which, with its associated techniques, is capable of successful application to the spectrum of problems encountered in optimization. The approach taken is of interest not only in leading to new results on non-smooth problems, but also in the context of traditional, smooth problems in the calculus of variations, in optimal control, or in mathematical programming. Chapter headings: 1. Introduction and Preview; 2. Generalized Gradients; 3. Differential Inclusions; 4. The Calculus of Variations; 5. Optimal Control; 6. Mathematical Programming; 7. Topics in Analysis.

Lectures in Geometry. By M. Postinikov. *Semester I: Analytic Geometry*. 340 pp. $8.45. *Semester II: Linear Algebra and Differential Geometry*. 315 pp. $8.45. MIR Publishers, Moscow, 1982. Available from: Imported Publications, Inc., 320 West Ohio Street, Chicago, Ill. 60610.

This textbook comprises lectures read by the author to first-year students of mathematics at Moscow State University. It is divided into two volumes containing the texts of lectures read in the first and second semesters, respectively. Volume I contains 29 lectures, and the subject matter is presented on the basis of vector axiomatics of geometry with special emphasis on logical sequence in introduction of the basic geometrical concepts. Systematic exposition and application of bivectors and trivectors enables the author to successfully combine the above course of lectures with lectures of the following semesters. Volume II contains 27 lectures. They treat linear algebra with elementary differential geometry of curves and surfaces in three-dimensional space.

Hydrodynamic Stability. By. P. G. Drazin and W. H. Reid. Cambridge University Press, New York, 1982. 518 pp. $24.95.

This is a paperback edition of the book first published in 1981. Some misprints and other errors have been corrected and a new problem on Rayleigh-Taylor instability as well as an addendum on weakly nonparallel theories for the Blasius boundary layer have been inserted.

Analysis of unbalanced data: a pre-program introduction. By Ching Chun Li. Cambridge University Press, New York, 1982. 144 pp.

This volume deals with the problem of analysing experimental data that consist of unequal numbers of observations in the cells of a two-way classification table. The author provides a step-by-step introduction to the analysis of such "unbalanced data". The exposition is by way of numerical examples; the explanations are in terms of the most elementary algebra.

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Introduction to Modern Business Statistics. By W. J. Conover and Ronald L. Iman. John Wiley & Sons, Inc., New York, 1983. 517 pp. $25.95

This is an abbreviated version of the text noted below, with the chapters on the general linear model, multiple regression, analysis of variance and covariance, and decision theory omitted.

Modern Business Statistics. By Ronald L. Iman and W. J. Conover. John Wiley & Sons, Inc., New York, 1983. 767 pp. $27.95.

This textbook is an introduction to modern statistical techniques. The emphasis is on training the student to proceed from a data-oriented situation to the proper statistical method. Most topics are introduced by means of a realistic problem setting. The method of solution is then unfolded with the objective of showing the student how to analyse a real situation. The problems, examples and exercises further emphasize realistic business-related settings in which these methods are useful. The support materials that accompany this text include an instructor's manual, study guide, transparencies and tests.

Theory of Viscoelasticity: An Introduction. By R. M. Christensen. Academic Press, New York, 1982. 357 pp. $45.00.

This book is intended to integrate many of the recent diverse theoretical developments to provide a reasonably complete and consistent description of the linear theory of the viscoelastic behavior of materials. Also, an introductory treatment is given for the general nonlinear theory of viscoelasticity. For the second edition, the chapter structure of the book has been revised and enlarged to accommodate developments in three major areas: (i) approximations for practical applications, (ii) problems for which integral transform methods do not apply, and (iii) nonlinear behavior. Chapter headings: 1. Viscoelastic Stress Strain Constitutive Relations; 2. Isothermal Boundary Value Problems; 3. Thermoviscoelasticity; 4. Mechanical Properties and Approximate Transform Inversion; 5. Problems of Nontransform Type; 6. Wave Propagation; 7. General Theorems and Formulations; 8. Nonlinear Viscoelasticity; 9. Nonlinear Mechanical Behavior.

Current Topics in Chinese Science, Section C, Mathematics, Volume 1. By the Academy of Science of the People's Republic of China. Gordon and Breach Science Publishers, New York, 1982. 486 pp.

Current achievements in research in the basic sciences in China are published in two journals sponsored by the Academy of Science of the People's Republic of China: *Science in China* (Scientia Sinica) and *Science Bulletin* (Kexue Tongbao). Each issue of these journals presents papers from many disciplines. In this series, Current Topics in Chinese Science, the publishers annually collect into one book all the articles in mathematics published in the preceding year. This volume contains 28 papers from Scientia Sinica and 35 papers from Kexue Tongbao.

Statistics for Research. By Shirley Dowdy and Stanley Wearden. John Wiley & Sons, Inc., New York, 1983. 532 pp.

This is a volume in the Wiley Series in Probability and Mathematical Statistics. It is a survey of the most commonly used techniques of statistical analysis. It is written from the viewpoint of the researcher who wants to know how to carry out a procedure, how to interpret the results, and who wants some intuitive understanding of why the procedure works. No previous statistical background is assumed, but the reader is taken through a substantial number of techniques. Theoretical mathematical discussions are avoided in favor of a more pragmatic approach which explains the various procedures in the context of realistic research situations and summarizes them in general terms.