QUARTERLY

OF

APPLIED MATHEMATICS

VOLUME XLIII JANUARY · 1986 NUMBER 4

QUARTERLY OF APPLIED MATHEMATICS

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Second-class postage paid at Providence, Rhode Island.
Publication number 808680. (ISSN 0033-569X).

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APPLIED MATHEMATICS

VOLUME XLIII 1985/86

CONTENTS

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

NEW BOOKS

Constitutive Laws for Engineering Materials. By C. S. Desai, H. J. Siriwardane. Prentice-Hall, Inc., 1984. 456 pp. $

The main aim of this text is to cover various recent models for complex (geologic) materials as influenced by factors such as state of stress, residual or inertial stress, volume changes under shear, stress history or stress paths, inherent and induced anisotropy, change in the physical state, and fluid in the pores. However, reviews and descriptions of conventional models are also included. Chapter 1 presents an introduction to the text, including a simple representation of constitutive laws. Brief statements of the axioms of continuum mechanics are given in Chapter 2 to make the reader aware that the constitutive laws are derived such that the axioms and natural principles are satisfied. Chapters 3 and 4 present reviews of strain and stress and definitions of their invariants as used in this text. Reasons for the study of advanced constitutive laws, their role in implementation in (numerical) solution schemes, the importance of laboratory testing with brief descriptions of test devices, and details of laboratory test results for an artificial soil obtained by using the truly triaxial device are included in Chapter 5. Higher-order elasticity (hyperelasticity) and hypoelasticity are the topics in Chapters 6 and 7, where detailed descriptions are given for models up to the second order. Chapters 9 to 11 cover details of the plasticity models. Introduction to the theory of plasticity together with classical models such as those of Tresca and von Mises are given in Chapter 9, while Chapter 10 covers other models such as by Mohr-Coulomb and Drucker-Prager. Critical state and cap models are discussed in Chapter 11. Chapter 12 gives a comprehensive review of recent developments, including kinematic hardening, kinematic and isotropic hardening, general anisotropic hardening, nonassociative models in plasticity and rate-type models involving a combination of hypoelasticity and critical state. Brief reviews of some recent developments, including viscoplastic and endochronic models and models for cyclic loading and for rocks, are presented at the end of this chapter. Appendixes 1 and 2 give reviews of tensor notation, invariants of tensors, and the Cayley-Hamilton theorem. Computer codes for least-squares fit and for computerized evaluation for parameters of the cap model are included in Appendixes 3 and 4, respectively.

Elliptic Partial Differential Equations of Second Order. By D. Gilbarg and N. S. Trudinger. Springer-Verlag, 1983. 490 pp. $45.50.

This is volume 224 of "Grundlehren der mathematischen Wissenschaften," a series of comprehensive studies in mathematics. It is the second edition of a monograph first published in 1977. Minor revisions have been made and new material added, including two chapters taking account of recent developments in the linear and nonlinear theory. The volume is intended as an essentially self-contained exposition of portions of the theory of second-order quasilinear elliptic partial differential equations, with emphasis on the Dirichlet problem in bounded domains. Preparatory chapters on topics such as potential theory and functional analysis are included to make the work accessible to a broad spectrum of readers. The seventeen chapters are divided into two parts, linear equations (1–9) and quasilinear equations (10–17). Chapter headings: 1. Introduction; 2. Laplace's Equation; 3. The Classical Maximum Principle; 4. Poisson's Equation and the Newtonian Potential; 5. Banach and Hilbert Spaces; 6. Classical Solutions; the Schauder Approach; 7. Sobolev Spaces; 8. Generalized Solutions and Regularity; 9. Strong Solutions; 10. Maximum and Comparison Principles; 11. Topological Fixed Point Theorems and Their Application; 12. Equations in Two Variables; 13. Hölder Estimates for the Gradient; 14. Boundary Gradient Estimates; 15. Global and Interior Gradient Bounds; 16. Equations of Mean Curvature Type; 17. Fully Nonlinear Equations.

Collapse: The Buckling of Structures in Theory and Practice. J. M. T. Thompson and G. W. Hunt, editors. Cambridge University Press, 1984. 526 pp. $79.50.

These are the proceedings of a symposium sponsored by the International Union of Theoretical and Applied Mechanics and held at University College, London, in September 1982. There are thirty papers and topics range from practical considerations of frame, plate and shell buckling to theoretical concepts of mode localization, catastrophe theory and chaotic vibrations. Interactive buckling of thin-walled columns, and questions of optimization were also examined.

Continued on page 430

Continued from page 420

A First Course in Fluid Dynamics, A. R. Paterson. Cambridge University Press, 1984. 518 pp. $59.50.

This text was written to introduce fluid dynamics to second year mathematics students at Bristol University. Chapter headings: 1. Mathematical preliminaries; 2. Physical preliminaries; 3. Observational preliminaries; 4. Mass conservation and stream functions; 5. Vorticity; 6. Hydrostatics; 7. Thermodynamics; 8. The equation of motion; 9. Solutions of the Navier-Stokes equations; 10. Inviscid flow; 11. Potential theory; 12. Sound waves in fluids; 13. Water waves; 14. High speed flow of air; 15. Steady surface waves in channels; 16. The complex potential; 17. Conformal mappings and aerofoils.

Mathematical Models of Morphogenesis. By René Thom. John Wiley & Sons, 1983. 305 pp. $59.95.

This is a volume in the Ellis Horwood Series "Mathematics and its Applications." It is an English translation of papers by René Thom originally published from 1967 to 1981. Each is preceded by a short introduction which sets them in the context of contemporary problematics as conceived by the author. The papers are, in general, more speculative and philosophical than preoccupied with pragmatic results. The author offers these models "not so much as testable hypotheses or as experimentally controllable models but as a stimulus to the imagination which leads to the exercise of thought and thus an increase in our understanding of the world and of man."

Geometrical Methods of Nonlinear Analysis. By M. A. Krasnosel'skii and P. P. Zabreiko. Springer-Verlag, 1984. 391 pp. $48.00.

This is volume 263 of "Grundlehren der mathematischen Wissenschaften," a series of comprehensive studies in mathematics. It is a translation of the 1975 Russian original edition. The book is intended for mathematicians, engineers and scientists interested in the qualitative behaviour of operator equations (existence theorems, estimates on the number of solutions, nontrivial solutions, connectivity of the solutions set, approximation schemes for the construction of solutions, dependence of solutions on parameters, etc.) The authors use methods which are derived from geometric ideas: rotation of vector fields, fixed point theory, concavity or monotonicity of nonlinearities, etc. Theorems and principles are illustrated by applying them for instance to the theory of nonlinear vibrations, boundary value problems, nonlinear integral equations, nonlinear mechanical problems, and critical values of functionals. The authors adopt a unified approach to many problems which at first glance may look completely different. In the first chapter, the authors study vector fields in finite-dimensional space. Rotation for various classes of vector fields in function spaces is discussed in Chapters 2 and 4, as are completely continuous vector fields and fields with noncompact operators, respectively. The main emphasis is on the problem of how to actually compute or estimate the rotation, for which one uses theorems on relatedness or invariance of rotation. Chapter 3 is devoted to this topic. In Chapter 5, geometric methods for existence proofs are developed. In doing so, the authors have restricted themselves to theorems which are manifestly important for applications to concrete problems and to results which are strikingly surprising and beautiful. In Chapter 6 they give estimates for the number of solutions for equations with nonlinear operators and obtain various principles for the existence of nontrivial solutions. In the short Chapter 7, approximation methods for the solution of nonlinear operator equations are studied. For instance, a connection between convergence of the method of successive approximations and the topological index of the solution is established. In the last chapter, various problems connected with small perturbations of operator equations are discussed. The reader of the book is assumed to have a basic knowledge of functional analysis and topology.

Continued on page 462

Continued from page 430

Statistical Methods for Cancer Studies. Richard G. Cornell, editor. Marcel Dekker, Inc., 1984. 496 pp. $59.50.

This is volume 51 in the series "Statistics: Textbooks and Monographs." The emphasis in this collection of nine papers by various authors is on public health and epidemiological aspects of cancer instead of medical aspects. The purpose of the book is the description of the statistical methodology developed for cancer studies. Randomized clinical trials are discussed in the context of the evaluation of screening programs and survival analysis in the context of studies of animal carcinogenesis. Chapter headings: 1. Assessing the Occurrence of Cancer in Human Populations; 2. Statistical Evaluation of the Risk of Cancer Mortality Among Industrial Populations; 3. Statistics of Case-Control Studies; 4. Methods of Survival Analysis; 5. Time-Space Clustering of Disease; 6. Statistical Methods for Genetic Studies of HLA and Cancer; 7. Evaluation of Screening Programs for the Early Detection of Cancer; 8. Models to Aid in Planning Cancer Screening Programs; 9. The Analysis of Animal Carcinogenicity Experiments.

Fluid Dynamics. H. Beirao da Veiga, editor. Springer-Verlag, 1984. 187 pp. $9.50.

This is volume 1047 of "Lecture Notes in Mathematics." It contains the texts of lectures and seminars presented at the International Summer Center, Varenna, Italy, August 22 to September 1, 1982, organized by Fondazione C.I.M.E. and sponsored by the Italian National Research Council. Survey talks were given by C. Bardos, A. Majda and J. Serrin. Those by J. Serrin on Concepts of Continuum Thermodynamics are not included since they will appear in book form.

Matrix Computations. By G. H. Golub and C. Van Loan. The Johns Hopkins University Press, 1984. 444 pp. $49.50 hardcover, $24.95 paperback.

This is a course in matrix computations for graduate students in technical areas, computational scientists and engineers, and numerical analysts. Special features are included to address each of these three groups. The first three chapters contain necessary background material. Matrix algebra is reviewed, and some key algorithms are established. Chapter 4 presents and analyzes the algorithm of Gaussian elimination, with special emphasis on error analysis and the condition estimation problem. The art of exploiting structure is the central theme of Chapter 5, where various special-purpose linear equation solvers are described. Chapter 6 picks up on another trend in the field—the increased reliance on orthogonal matrices. The authors discuss several orthogonalization methods and show how they can be applied to the least squares problem. Special attention is paid to the handling of rank deficiency. The all-powerful QR algorithm for the unsymmetric eigenvalue problem is the centerpiece of Chapter 7. The authors' pedagogic derivation should help to demystify this important technique. They also comment on invariant subspace calculation and the generalized eigenvalue problem. In Chapter 8 they continue their discussion of the eigenvalue problem by focussing on the important symmetric case. They first describe the symmetric QR algorithm and then proceed to show how symmetry permits several alternative computational procedures. Up to this point in the book the treatment of sparsity is rather scattered. Banded linear system solvers are discussed in Chapter 5, simultaneous iteration is described in Chapter 7, Rayleigh quotient iteration in Chapter 8, and so on. Chapters 9 and 10, however, are entirely devoted to the solving of sparse matrix problems. The discussion revolves around the Lanczos method and its cousin, the method of conjugate gradients. The authors show how various sparse eigenvalue, least squares, and linear equation problems can be solved using these important algorithms. The purpose of the last two chapters in the book is to illustrate the wide applicability of the algorithms presented in Chapters 4–8. Chapter 11 deals with the problem of computing a function of a matrix, something that is frequently required in applications of control theory. Chapter 12 describes a selection of special matrix problems, several of which highlight the power of the singular value decomposition.

Continued on page 500

Continued from page 462

Structural Theory of Distributed Systems. By A. G. Gutkovskiy. John Wiley & Sons, 1983. 298 pp. $84.95.

This is a volume in the Ellis Horwood Series in Mathematics and its Applications. The state and motion of a distributed system is characterized by an infinite set of coordinates or by distribution functions which also depend on time, and described by partial differential equations and integral equations. The book can be divided into three parts. In the first, the author discusses basic and general notions in the theory of distributed signals, distributed blocks, and structural or block diagrams. Here he derives rules for constructing and transforming structural diagrams on the basis of impulse response functions and transfer functions for distributed systems. The second part of the book is devoted to examples of the application of the structural theory to the description and investigation of concrete distributed parameter systems. Examples include heat conduction and electrical and aerodynamic processes; several sections are devoted to problems in building mechanics and on flexible structures. The third section is concerned with general problems in the theory of distributed parameter systems: controllability, finite control, observability, etc. Chapter headings: 1. General Theory of Structural Diagrams for Distributed Parameter Systems; 2. The Structural Representation of some Applied Problems; 3. The Structural Representation of Problems on Elastic Structures; 4. The Quenching of Oscillations in Distributed Lines; 5. Controllability, Finite Control, Observability, Synthesis of Linear Distributed Systems.

Production, Purpose and Structures. By Jeremy Bray. Frances Pinter, London, 1982. 167 pp. $7.45.

In this book the author, a student of J. E. Littlewood and a British member of Parliament, puts forward a socialist theory of production together with practical applications. The theory is based on an examination of the foundations of economics from Adam Smith through Mill and Marx to the frontiers of modern mathematical economic theory. On economic modelling, he expresses his indebtedness to Richard Stone, Lawrence Klein and David Hendry; on economic theory to Frank Hahn, Steve Smale, et al.; on self-organising systems to Ilya Prigogine, Lee Segel, et. al. He argues that economists have yet to make use of the mathematics of nonequilibrium systems, which can explain the spontaneous emergence of new structures out of chaos and disorder.

Nonlinear Filtering and Smoothing: An Introduction to Martingales, Stochastic Integrals and Estimation. By V. Krishnan. John Wiley & Sons, 1984. 306 pp. $34.95.

The continued rapid advances in the martingale approach to filtering and smoothing problems made it necessary to give engineering students a clear physical understanding of the fundamental concepts in this area. As a consequence, applicational aspects have been stressed throughout this book. Starting with the basic concepts of probability and stochastic processes in Chapters 1 and 2, martingales and square integrable martingales are introduced in Chapters 3 and 4. Chapter 5 covers white noise and white noise integrals with an introduction to Fourier transforms and spectral measures. Chapters 6 and 7 deal with stochastic integrals and stochastic differential equations and the associated Ito calculus and extensions to the Ito calculus. Differences between white noise differential equations and the corresponding stochastic differential equations are emphasized. After defining the Stratonovich integral, the correction terms needed for computational purposes to convert the Ito stochastic differential equation to the Stratonovich form are derived. Chapter 8 contains the derivations of optimal nonlinear filtering representation. The heuristic derivation of the Kalman filter is contained in Chapter 9, and it is also derived as a special case of the general nonlinear filtering representation. In Chapter 10 fault detection problems using the nonlinear filtering representation are considered, and Chapter 11 contains some of the results of the work on smoothing problems carried out by the author and his students. In the entire text, the physical understanding of the problem is stressed and hence rigorous mathematical proofs in some cases are abandoned in favor of heuristic proofs.

Continued on page 508

Continued from page 500

Semigroups of Linear Operators and Applications to Partial Differential Equations. By A. Pazy. Springer-Verlag, 1983. 276 pp. $29.80.

This is volume 44 in the series "Applied Mathematical Sciences." It is a corrected and expanded version of a set of lecture notes which the author wrote at the University of Maryland in 1972-1973. The first three chapters present a short account of the abstract theory of semigroups of bounded linear operators. Chapters 4 and 5 give a more detailed study of the abstract Cauchy problem for autonomous and nonautonomous linear initial value problems, while Chapter 6 is devoted to some abstract nonlinear initial value problems. The first six chapters are self-contained and the only prerequisite needed is some elementary knowledge of functional analysis. Chapters 7 and 8 present applications of the abstract theory to concrete initial value problems for linear and nonlinear partial differential equations. Some of the auxiliary results from the theory of partial differential equations used in these chapters are stated without proof. References where the proofs can be found are given in the bibliographical notes to these chapters.

Design and Analysis of Experiments, Second Edition. By D. C. Montgomery. John Wiley & Sons, 1984. 497 pp. $37.95.

This is the second edition of a book first published in 1976. It is a major revision. There is now a strong emphasis on model adequacy checking for the analysis of variance. Other new topics include an introduction to methods for dealing with unbalanced data, more extensive coverage of fractional factorials, expanded discussion of the multiple comparison problem, and more guidelines for the choice of sample size. Moreover, much of the material from the first edition has been extensively reorganised.

First Order Elliptic Systems. By R. P. Gilbert, J. L. Buchanan. Academic Press, 1983. 268 pp. $45.00.

This is volume 163 of the series "Mathematics in Science and Engineering." It is a successor to an earlier monograph in this series, entitled "Function Theoretic Methods in Partial Differential Equations," published in 1969. It seeks from among those systems of first-order partial differential equations that are in some sense elliptic those that share common properties with the prototypical elliptic system, the Cauchy-Riemann equations. The authors' considerations are dominated by the following questions concerning solutions to such systems and their similarity to analytic functions: (a) Do they possess integral representations analogous to the Cauchy integral formula? (b) Are the classical boundary value problems for analytic functions—the Hilbert and Riemann-Hilbert problems—still appropriate? (c) Do they have the unique continuation property so that if all entries of a solution vector vanish on an open set, then the solution is identically zero? (d) Can the zeros common to all entries of a solution have an accumulation point within the domain? (e) Is Liouville's theorem still valid? Most particularly, must an entire solution which vanishes at infinity vanish identically? (f) Can the notion of the order of a zero be extended? The first three chapters of the monograph give answers, as far as they are known, to those questions. Chapter 4 investigates certain systems in higher dimensions, and Chapter 5 explores the generalizations of the results of the first three chapters to functions of several complex variables.

Volterra Integral and Differential Equations. By T. A. Burton. Academic Press, 1983. 302 pp. $45.00.

This is volume 167 of the series "Mathematics in Science and Engineering." It is primarily an exposition of Liapunov's direct method. Its purpose is to enable mathematicians, physicists, engineers and other scientists who are well versed in stability theory of ordinary differential equations on the real line using elementary differentiation and Riemann integration to parley their existing expertise into a knowledge of theory and application of Volterra equations and to introduce them to the great range of physical applications of the subject. Chapter headings: 0. Introduction and Overview; 1. The General Problems; 2. Linear Equations; 3. Existence Properties; 4. History, Examples, and Motivation; 5. Instability, Stability, and Perturbations; 6. Stability and Boundedness; 7. Perturbations; 8. Functional Differential Equations.

Continued on page 522

Continued from page 508

Solitons. By P. G. Drazin. Cambridge University Press, 1983. 127 pp. $15.95.

The aim of this book is to make the essense of the method of inverse scattering understandable as easily as possible. The fundamentals are introduced from the point of view of a course of advanced calculus or the mathematical methods of physics. Chapter headings: 1. The Korteweg-de Vries Equation; 2. Cnoidal Waves; 3. Conservation Laws; 4. The Initial-value Problem for the Korteweg-de Vries Equation; 5. The Lax Method; 6. The Sine-Gordon Equation; 7. Bäcklund Transformations; 8. Epilogue; Appendix. A derivation of the Integral Equation for Inverse Scattering.

Annual Review of Fluid Mechanics. M. Van Dyke, J. V. Wehausen, and J. L. Lumley, editors. Annual Reviews, Inc., 1984. 419 pp. $28.00.

This volume contains fifteen articles: "Karl Pohlhausen, As I Remember Him," by Know Millsaps; "Wave Action and Wave-Mean Flow Interaction, With Application to Stratified Shear Flows," by R. Grimshaw; "The Deformation of Small Viscous Drops and Bubbles in Shear Flows," by J. M. Rallison; "Numerical Solution of the Nonlinear Boltzmann Equation for Nonequilibrium Gas Flow Problems," by S. M. Yen; "Numerical Simulation of Turbulent Flows," by Robert S. Rogallo and Parviz Moin; "Nonlinear Interactions in the Fluid Mechanics of Helium II," by H. W. Leipmann and G. A. Laguna; "Secondary Flow in Curved Open Channels," by Marco Falcon; "Vortex Shedding from Oscillating Bluff Bodies," by P. W. Bearman; "Modern Optical Techniques in Fluid Mechanics," by Werner Lauterborn and Alfred Vogel; "Stability and Coagulation of Colloids in Shear Fields," by W. R. Schowalter; "Aerocoustics of Turbulent Shear Flows," by M. E. Goldstein; "Computer-Extended Series," by Milton Van Dyke; "Dynamic Parameters of Gaseous Detonations," by John H. S. Lee; "Supercritical Airfoil and Wing Design," by H. Sobieczky and A. R. Seebass; "Perturbed Free Shear Layers," by Chih-Ming Ho and Patrick Huerre.

Semidynamical Systems in Infinite Dimensional Space. By Stephen H. Saperstone. Springer-Verlag, 1981. 446 pp. $30.95.

This is volume 37 in the series "Applied Mathematical Sciences." Its purpose is to answer the question "where do solutions go and how do they behave en route" for certain classes of differential equations by recourse to the framework of semidynamical systems (or topological dynamics). This approach makes it possible to treat a broad range of equations from nonautonomous ordinary and partial to stochastic differential equations. The basic idea is to embed some representation of the solutions of the equation in an appropriate function space for the semidynamical system. Chapter headings: 1. Basic Definitions and Properties; 2. Invariance, Limit Sets, and Stability; 3. Motions in Metric Space; 4. Nonautonomous Ordinary Differential Equations; 5. Semidynamical Systems in Banach Space; 6. Functional Differential Equations; 7. Stochastic Dynamical Systems; 8. Weak Semidynamical Systems and Processes. There are appendices on functional analysis and probability theory to make the presentation self-contained.

Digital Computer Arithmetic—Design and Implementatino. By Joseph J. F. Cavanagh. McGraw-Hill Book Company, 1984. 454 pp. $

The purpose of this book is to present digital computer arithmetic covering fixed-point, binary-coded decimal, and floating-point number representations for the operations of addition, subtraction, multiplication, and division as employed in a high-speed execution unit. The arithmetic algorithms, processor architectures, and design methodologies are presented in sufficient detail to permit both ease of understanding and hardware design implementation. Logic diagrams accompany each of the methods presented and use technology-independent VLSI. New methods of computer arithmetic are also described—methods that are currently being designed into future high-speed processors.

Probability and Information. A. M. Yaglom and I. M. Yaglom, editors. D. Reidel Publishing Co., 1983. 421 pp. $69.00.

This is a translation of the third revised and enlarged Russian edition of 1973, but contains significant revisions and additions to that edition (e.g., the discussion of the amount of information contained in spoken and written texts is now based on the English rather than the Russian language). The book is essentially an elementary introduction to Shannon's information theory, including applications to communication and radio engineering, linguistics, biology and psychology. There is a rigorous presentation of the mathematical foundation of information theory and a discussion of the informational capacity of various engineering and natural communication channels. A feature of the book is that the presentation is completely elementary and no mathematical background beyond high school mathematics is needed for its understanding. Chapter headings: 1. Probability; 2. Entropy and Information; 3. The Solution of Certain Logical Problems by Calculating Information; 4. Application of Information Theory to the Problem of the Information Transmission Through Communication Channels.

Texts of Dynamics, second edition. By F. Chorlton. John Wiley & Sons, 1983. 271 pp. $29.95 paperback, $49.95 hardcover.

This is a volume in the Ellis Horwood Series "Mathematics and Its Applications." It is a modern treatment, based on vectorial methods and on the analytical developments of Lagrange.

Trends in Theory and Practice of Nonlinear Differential Equations. V. Lakshmikantham, editor. Marcel Dekker, Inc., 1984. 562 pp. $59.75.

This is volume 90 of "Lecture Notes in Pure and Applied Mathematics." It constitutes the proceedings of an International Conference held at the University of Texas at Arlington in honor of Professor E. A. Coddington in June 1982. The following topics were discussed: spectral theory for symmetric pairs of differential operators, Lotka-Volterra systems, generalized inverses for linear manifolds, nonlinear problems at resonance, steepest descent methods, reaction-diffusion equations, Lyapunov stability, stochastic differential equations, comparison and frequency domain techniques, delay differential equations, method of upper and lower solutions, Newton-like methods, periodic solutions of nonlinear problems, population biology, effects of harvesting on population systems, models of toxicant population, nonlinear equations of heat flow, inclusion principle for hereditary systems, neuromuscular systems, transform techniques in qualitative theory of systems, vector Lyapunov functions in the analysis of dynamical properties of differential equations, recent topics on nonlinear contraction semigroups, set valued extensions of integral inequalities, global controllability of nonlinear delay systems, cone-valued Lyapunov functions, large-scale systems, quasi-solutions, almost periodicity of solutions of parabolic equations, generalized Hopf bifurcation and exchange of stability and nonlinear elliptic problems.

Network optimization practice: A computational guide. By David K. Smith. John Wiley & Sons, New York, 1982. 237 pp. $59.95.

This is a volume in the Ellis Horwood Series "Mathematics and Its Applications." It is a textbook on network analysis, emphasizing the connection with graph theory and the computational aspects of this part of operations research. In order to bridge the gap between theory and practice, it presents listings of computer programs in BASIC and PASCAL which demonstrate the algorithms derived in the text. Chapter headings: I. Introduction. 2. Simple Algorithms for Graphs. 3. Optimal Paths in Networks. 4. Optimal Flow Algorithms. 5. Networks for Scheduling Jobs and Activities. 6. Tours in Networks.

Geometry. By G. N. Yakovlev. Mir Publishers, Moscow. Distributed by Imported Publications, Inc., Chicago, Illinois, 1982. 288 pp. $7.45.

This is an introductory textbook for students of Russian secondary technical schools and colleges, covering vectors in the plane and space, the straight line, second-order curves, straight lines and planes in space, polyhedra, simple curvilinear surfaces, solids of revolutions, volumes of solids, areas of surfaces. Includes numerous problems with answers.

Fundamentals of Data Structures in Pascal. By Ellis Horowitz and Sartaj Sahni. Computer Science Press, 1984. 537 pp. $26.95.

This is a volume in the Computer Software Engineering Series. It is based on the 1976 text *Fundamentals of Data Structures*, translating its algorithms into Pascal. The book covers all the topics necessary to a data structures course—not only stacks, queues, lists, and trees, but also hashing, sorting, searching, graphs, and files. The computing time and space requirements of each algorithm are carefully analyzed and the basic skills of algorithm analysis taught through data structure design. Chapter headings: 1. Introduction; 2. Arrays; 3. Stacks and Queues; 4. Linked Lists; 5. Trees; 6. Graphs; 7. Internal Sorting; 8. External Sorting; 9. Symbol Tables; 10. Files.

Studies in Applied Mathematics. Victor Guillemin, editor. Academic Press, 1983. 163 pp. $36.00.

This is volume 8 of "Advances in Mathematics Supplementary Studies," and is dedicated to Irving Segal. It deals mainly with applications of functional analysis, ranging from the extremely pure to the very applied and touching on subjects as unrelated as constructive field theory and fluid dynamics. Since all the papers are written in the language of functional analysis, however, they should be accessible to any mathematician. A list of contributors: J. D. Alvarez Alonso, A. P. Calderon, Y. Choquet-Bruhat, D. Christodoulou, L. Gording, Harish-Chandra, T. Kato, J. Leray, E. Nelson, R. S. Phillips, S. Sakai.

The Radon Transform and Some of Its Applications. By Stanley R. Deans. John Wiley & Sons, 1983. 281 pp. $34.95.

The Radon transform provides the unifying framework for the determination or reconstruction of some aspect of an objects' internal structure without having to alter or damage the object under investigation. This book brings together applications, theory, definitions, theorems, and properties of the Radon transform. It also provides numerous examples illustrating some of the transform's more complex characteristics, and presents an English translation of Johann Radon's original paper where the transform was introduced. Chapter headings: 1. Major Fields of Application; 2. Definition of the Radon Transform; 3. Basic Properties; 4. Relation to Other Transforms; 5. Inversion; 6. Recent Development of Inversion Methods; 7. Series Methods; 8. More Properties, Applications, and Generalizations. Appendix A, Translation of Radon's 1917 Paper; Appendix B, Generalized Functions; Appendix C, Special Functions.

Computational Aspects of Complex Analysis. H. Werner, L. Wuytack, E. Ng, and H. J. Bunger, editors. D. Reidel Publishing Co., 1983. 414 pp. $54.00.

These are the Proceedings of the NATO Advanced Study Institute held at Braunlage, Harz, Germany, July 26—August 6, 1982. It includes the invited papers presented, by C. Brezinski, D.Gaier, M. H. Gutknecht; P. Henrici, J. Meinguet, G. Merz, F. W. J. Olver, G. T. Symm, L. N. Trefethen, H. Werner, and D. Y. Y. Yun, and summaries of 17 short communications. The main topics at the Institute were problems dealing with approximation and interpolation by polynomial and rational functions (in particular, Padé approximation), numerical methods for the solution of algebraic and differential equations, conformal mapping, aspects of computer implementation of complex arithmetic, and calculations based on complex variable techniques.