QUARTERLY

OF

APPLIED MATHEMATICS

VOLUME LIX **SEPTEMBER • 2001** **NUMBER 3**

Quarterly of Applied Mathematics

The *Quarterly of Applied Mathematics* 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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This journal is indexed in *Mathematical Reviews*, *Zentralblatt MATH*, *Science Citation Index*®, *Science Citation Index*™*-Expanded*, *ISI Alerting Services*℠, *CompuMath Citation Index*®, *Current Contents*®*/Engineering, Computing & Technology*. It is also indexed by *Applied Science & Technology Index* and abstracted by *Applied Science & Technology Abstracts*.
Periodicals postage paid at Providence, Rhode Island.
Publication number 808680 (ISSN 0033-569X)

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 that 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(200109)59:3;1-9

Wavelets: Calderón-Zygmund and Multilinear Operators. By Yves Meyer and Ronald Coifman, Cambridge University Press, 2000, viii+314 pp., $69.95 (hardback), $39.95 (paperback)

This is volume 48 in the series Cambridge Studies in Advanced Mathematics; it is a translation, by David Salinger, of *Ondelettes et Opérateurs*, volume II, *Opérateurs de Calderón-Zygmund* by Yves Meyer, and Volume III, *Opérateurs multilinéaires* by R. R. Coifman and Yves Meyer. The original numbering of the chapters and of the theorems has been retained so that it is still possible to follow the forward references in Volume I, *Ondelettes* by Yves Mayer, translated as *Waves and Operators* (Cambridge University Press, 1992). Chapter headings: 7. The new Calderón-Zygmund operators; 8. David and Journé's $T(1)$ theorem; 9. Examples of Calderón-Zygmund operators; 10. Operators corresponding to singular integrals: their continuity on Hölder and Sobolev spaces; 11. The $T(b)$ theorem; 12. Generalized Hardy spaces; 13. Multilinear operators; 14. Multilinear analysis of square roots of accretive operators; 15. Potential theory in Lipschitz domains; 16. Paradifferential operators.

Analysis of Multivariate Survival Data. By Philip Hougaard, Springer-Verlag, 2000, xvii+542 pp., $84.95

This is a volume in the series Statistics for Biology and Health. It covers multivariate survival situations such as: survival of several individuals, which are related in some way and where independence cannot be assumed; multiple data, where repeated occurrences of the same event are studied; times to several events for the same persons, like outbreak of disease. Much of this material is only available in journal papers, or not at all. The field of application in this book is medical and biological, but the theory is also applicable to technical reliability, demography, actuarial science and other fields where multivariate times are observed. The book is intended for persons who already have some experience with survival data, but the introductory chapters contain the material needed for the other chapters, but in concise form. Chapter headings: 1. Introduction; 2. Univariate survival models; 3. Dependence structures; 4. Bivariate dependence measures; 5. Probability aspects of multi-state models; 6. Statistical inference for multi-state models; 7. Shared frailty models; 8. Statistical inference for shared frailty models; 9. Shared frailty models for recurrent events; 10. Multivariate frailty models; 11. Instantaneous and short-term frailty models; 12. Competing risks models; 13. Marginal and copula modeling; 14. Multivariate non-parametric estimates; 15. Summary. There is a bibliography with 214 items.

Fluid Dynamics at Interfaces. Edited by Wei Shyy and Ranga Narayanan, Cambridge University Press, 1999, xv+461 pp., $100.00

These are the proceedings of a symposium held in Gainesville, Florida, in June of 1998, held in memory of the late Professor Chia-Shun Yih, who pioneered the field of interfacial flows. There are 34 papers, grouped into five parts: 1. Bénard and thermocapillary instabilities; 2. Shear and pressure driven instabilities; 3. Waves and dispersion; 4. Multiphase systems; 5. Complex flows.

Probability and Statistical Inference. By Robert Bartoszyński and Magdalena Niewiadomska-Bugaj, John Wiley and Sons, 1996, xvi + 826 pp., $59.95

This is a volume in the Wiley Series in Probability and Statistics. It is intended as a textbook for upper-level undergraduate and lower-level graduate students in departments of statistics, as well as in departments where statistics is taught as a tool to be used in research and applications. The authors stress the study of statistics as the science and art of inductive inference and of subsequent decisions based on that inference, without regard to the particular subject matter, but subsequently present a wealth of real world applications of the methodology. Chapter headings: 1. Experiments, sample spaces, and events; 2. Probability; 3. Combinatorial probability; 4. Conditional probability, independence; 5. Markov chains; 6. Random variables: univariate case; 7. Random variables: multivariate case; 8. Expectation; 9. Some probability models; 10. Limit theorems; 11. Outline of inferential statistics; 12. Estimation; 13. Testing statistical hypotheses; 14. Discrimination; 15. Linear models; 16. Rank methods; 17. Analysis of categorical data.

Statistical Tests for Mixed Linear Models. By André I. Khuri, Thomas Mathew, and Bimal K. Sinha, John Wiley and Sons, 1998, xi + 352 pp., $69.95

This is a volume in the Wiley Series in Probability and Mathematical Statistics. It deals primarily with the analysis of unbalanced data, since analysis of balanced data is straightforward, the ANOVA decomposition of the total sum of squares being unique in that case and the different sum of squares in such a decomposition providing tests for various hypotheses of interest. In an unbalanced data situation, there is no unique way of writing the ANOVA table. Moreover, the sums of squares in such an ANOVA table are not in general independent or distributed as multiples of chi-squared variates. Consequently, little is known about exact or optimum tests. The main purpose of this book is to compile the available results in this area into a single volume. Chapter headings: 1. Nature of exact and optimum tests in mixed linear models; 2. Balanced random and mixed models; 3. Measures of data imbalance; 4. Unbalanced one-way and two-way random models; 5. Random models with unequal cell frequencies in the last stage; 6. Tests in unbalanced mixed models; 7. Recovery of inter-block information; 8. Split-plot designs under mixed and random models; 9. Tests using generalized P-values; 10. Multivariate mixed and random models. There are many exercises with solutions to selected ones, and there is a bibliography of about 150 items.

Methods for Statistical Data Analysis of Multivariate Observations. By R. Gnanadesikan, John Wiley and Sons, 1997, xvi + 353 pp., $69.95

This is a volume in the Wiley Series in Probability and Statistics and the second edition of the book first published in 1977. New material appears in virtually every chapter. A major expansion is the material on cluster analysis. Also added is material on new and useful summarization and exposure techniques, e.g., on new graphical methods for assessing the separations amongst the eigenvalues of a correlation matrix and for comparing sets of eigenvectors. The section on robust estimation has been enlarged and so has the class of distributional models discussed. There is a new appendix on software, in particular with reference to S-Plus functions and SAS routines. Chapter headings: 1. Introduction; 2. Reduction of dimensionality; 3. Development and study of multivariate dependencies; 4. Multidimensional classification and clustering; 5. Assessment of specific aspects of multivariate statistical models; 6. Summarization and exposure.

Sequential Estimation. By Malay Ghosh, Nitis Mukhopadhyay, and Pranab K. Sen, John Wiley and Sons, 1997, xi + 480 pp.

This is a volume in the Wiley Series in Probability and Statistics. Whereas sequential hypothesis testing has received a great deal of attention since Wald's seminal (1947) book, sequential estimation has received much less. It is the focus of this book, including both parametric and nonparametric methods. It also deals with shrinkage, empirical and hierarchical Bayes procedures, time-sequential estimation, empirical and hierarchical population sampling, reliability estimation, and capture-recapture methodology leading to sequential schemes. Chapter headings: 1. Introduction and coverage; 2. Probabilistic results in sequential analysis; 3. Some basic concepts for fixed sample estimation; 4. General aspects of sequential estimation; 5. Sequential Bayesian estimation; 6. Multistage estimation; 7. Parametric sequential point estimation; 8. Parametric sequential confidence estimation; 9. Nonparametric sequential point estimation; 10. Nonparametric sequential confidence estimation; 11. Estimation following sequential tests; 12. Time-sequential estimation problems; 13. Sequential estimation in reliability models; 14. Sequential estimation of the size of a finite population; 15. Stochastic approximation.

The EM Algorithm and Extensions. By Geoffrey J. McMachlan and Thriyambakam Krishnan, John Wiley and Sons, 1996, xvii + 274 pp., $59.95

This is a volume in the Wiley Series in Probability and Statistics. This book deals with the expectation-maximization algorithm, popularly known as the EM algorithm, a general-purpose algorithm for maximum likelihood estimation in incomplete-data problems, e.g., where there are missing data, truncated distributions, censored or grouped observations, and also where the incompleteness of the data is not natural or evident. The algorithm has its limitations and a number of modifications and extensions have been developed to overcome them. Current developments are in the direction of iterative simulation techniques or Markov Chain Monte Carlo methods. This book is aimed at theoreticians and practitioners of statistics and its objective is to introduce them to the principles and methodology of the EM algorithm and its tremendous potential for applications. The main parts of the book, describing the formulation of the EM algorithm, discussing aspects of its implementation, and illustrating its application in many simple statistical contexts, should be comprehensible to graduates with statistics as their major subject. Throughout, theory and methodology are illustrated with a number of examples. Chapter headings: 1. General introduction; 2. Examples of the EM algorithm; 3. Basic theory of the EM algorithm; 4. Standard errors and speeding up convergence; 5. Extensions of the EM algorithm. 6. Miscellaneous topics.

Hard Ball Systems and the Lorentz Gas. Edited by D. Szász, Springer-Verlag, 2000, viii + 458 pp., $99.00

This is volume 101 of the Encyclopedia of Mathematical Sciences. Hard ball systems are isomorphic to point-particle billiard systems, i.e., to a model when a point particle moves with a uniform motion and has specular (optical) reflection at some fixed scatterers. A point-particle billiard in the (noncompact) space is called the Lorentz process, whereas an ideal gas of such particles is the Lorentz gas. The book is a collection of papers divided into two parts according to whether the majority of the results is mathematically rigorous (8 papers) or is obtained by the methods of physics (4 papers). There is an introduction and an appendix by the editor, the latter entitled *Boltzmann's ergodic hypothesis, conjecture for centuries?*

Orthogonal Polynomials of Several Variables. By Charles F. Dunkl and Yuan Xu, Cambridge University Press, 2001, xv + 390 pp., $80.00

This is a volume in the series Encyclopedia of Mathematics and its Applications. Its aim is to present the developments of very recent research to a readership trained in classical analysis, including, for instance, applied mathematicians, physicists, chemists and mathematical biologists. The emphasis is on families of polynomials whose weight functions are supported on standard domains such as the simplex and the ball, or of Gaussian type, which satisfy differential-difference equations, and for which fairly explicit formulae exist. The authors use standard notation for analysis on Euclidean space and assume basic knowledge of Fourier and functional analysis, matrix theory, and elementary group theory. Chapter headings: 1. Background; 2. Examples of orthogonal polynomials in several variables; 3. General properties of polynomials in several variables; 4. Root systems and Coxeter groups; 5. Spherical harmonics associated with reflection groups; 6. Classical and generalized classical orthogonal polynomials; 7. Summability of orthogonal expansions; 8. Orthogonal polynomials associated with octahedral groups and applications. There is a bibliography of about 250 items.

An Introduction to Magnetohydrodynamics. By P. A. Davison, Cambridge University Press, 2000, xviii + 431 pp., $110.00 (hardback), $39.95 (paperback)

This is a volume in the series Cambridge Texts in Applied Mathematics. Part A of the book is intended as an introductory text for advanced undergraduate and graduate students in physics, applied mathematics and engineering. Part B is a research monograph, meant as a reference for professional researchers in industry and academia. Chapter headings: Part A: The fundamentals of MHD: 1. A qualitative overview of MHD; 2. The governing equations of electrodynamics; 3. The governing equations of fluid mechanics: (i) Fluid flow in the absence of Lorentz forces, (ii) Incorporating the Lorentz force; 4. Kinematics of MHD: advection and diffusion of a magnetic field; 5. Dynamics at low magnetic Reynolds' numbers: (i) Suppression of motion, (ii) Generation of motion, (iii) Boundary layers; 6. Dynamics at moderate to high magnetic Reynolds' numbers; 7. MHD turbulence at low and high magnetic Reynolds' numbers; Part B: Applications in engineering and metallurgy: 8. Magnetic stirring using rotating fields; 9. Magnetic damping using static fields; 10. Axisymmetric flows driven by the injection of current; 11. MHD instabilities in reduction cells; 12. High-frequency fields: magnetic levitation and induction heating.

Perspectives in Fluid Dynamics—A Collective Introduction to Current Research. By G. K. Batchelor, H. K. Moffatt, and M. G. Worster, Cambridge University Press, 2000, xii + 629 pp., $160.00

This book was the inspiration of George Batchelor, who conceived it as a kind of sequel to his famous textbook *An Introduction to Fluid Mechanics*, since he realized that writing such a sequel was beyond the abilities of any one person. Sadly, he died on 30 March 2000 without seeing the completion of the project, but he had played a full part in choosing the authors and defining the style of the book. The authors are dedicating the book to George Batchelor's memory for having inspired generations of fluid dynamicists through his founding in 1956 and editorship for more than forty years of the *Journal of Fluid Mechanics* and through his remarkable text. The book contains the following chapters: 1. Interfacial fluid mechanics, by Stephen H. Davis; 2. Viscous fingering as an archetype for growth patterns, by Yves Couder; 3. Blood flow in arteries and veins, by T. J. Pedley; 4. Open shear flow instabilities, by Patrick Huerre; 5. Turbulence, by Javier Jiménez; 6. Convection in the environment, by P. F. Linden; 7. Reflections on magnetohydrodynamics, by H. K. Moffat; 8. Solidification of fluids, by M. G. Worster; 9. Geological fluid mechanics, by Herbert E. Huppert; 10. The dynamic ocean, by Chris Garret; 11. On global scale atmospheric circulations, by Michael E. McIntyre.