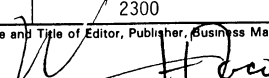


U.S. Postal Service

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

Required by 39 U.S.C. 3685

| | | | | |
|--|--|---|--|--|
| 1A. Title of Publication Mathematics of Computation | | 1B. PUBLICATION NO. 0 0 2 5 5 7 1 8 | | 2. Date of Filing 9-20-89 |
| 3. Frequency of Issue Quarterly | | 3A. No. of Issues Published Annually 4 | | 3B. Annual Subscription Price \$183 (1989) |
| 4. Complete Mailing Address of Known Office of Publication (Street, City, County, State and ZIP+4 Code) (Not printers) 201 Charles Street, Providence, RI 02904 | | | | |
| 5. Complete Mailing Address of the Headquarters of General Business Offices of the Publisher (Not printer) 201 Charles Street, Providence, RI 02904 | | | | |
| 6. Full Names and Complete Mailing Address of Publisher, Editor, and Managing Editor (This item MUST NOT be blank) | | | | |
| Publisher (Name and Complete Mailing Address) American Mathematical Society, P.O. Box 6248, Providence, RI 02940 | | | | |
| Editor (Name and Complete Mailing Address) Walter Gautschi, Dept. of Comp. Sci., Purdue Univ., W. Lafayette, IN 47907 | | | | |
| Managing Editor (Name and Complete Mailing Address) Christine Lefian, AMS, P.O. Box 6248, Providence, RI 02940 | | | | |
| 7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Item must be completed.) | | | | |
| Full Name | | Complete Mailing Address | | |
| American Mathematical Society | | P.O. Box 6248, Providence, RI 02942 | | |
| | | | | |
| | | | | |
| 8. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities (If there are none, so state) | | | | |
| Full Name | | Complete Mailing Address | | |
| None | | | | |
| | | | | |
| | | | | |
| 9. For Completion by Nonprofit Organizations Authorized to Mail at Special Rates (DMM Section 423.12 only) The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes (Check one) | | | | |
| <input checked="" type="checkbox"/> (1) Has Not Changed During Preceding 12 Months | | <input type="checkbox"/> (2) Has Changed During Preceding 12 Months | | (If changed, publisher must submit explanation of change with this statement.) |
| 10. Extent and Nature of Circulation (See instructions on reverse side) | | Average No. Copies Each Issue During Preceding 12 Months | | Actual No. Copies of Single Issue Published Nearest to Filing Date |
| A. Total No. Copies (Net Press Run) | | 2300 | | 2300 |
| B. Paid and/or Requested Circulation | | 235 | | 235 |
| 1. Sales through dealers and carriers, street vendors and counter sales | | | | |
| 2. Mail Subscription (Paid and/or requested) | | 1663 | | 1646 |
| C. Total Paid and/or Requested Circulation (Sum of 10B1 and 10B2) | | 1898 | | 1881 |
| D. Free Distribution by Mail, Carrier or Other Means (Samples, Complimentary, and Other Free Copies) | | 72 | | 72 |
| E. Total Distribution (Sum of C and D) | | 1970 | | 1953 |
| F. Copies Not Distributed | | 330 | | 347 |
| 1. Office use, left over, unaccounted, spoiled after printing | | | | |
| 2. Return from News Agents | | 0 | | 0 |
| G. TOTAL (Sum of E, F1 and 2—should equal net press run shown in A) | | 2300 | | 2300 |
| 11. I certify that the statements made by me above are correct and complete | | Signature and Title of Editor, Publisher, Business Manager, or Owner  | | EXEC. DIR. |

Information for Contributors

Authors are encouraged to prepare articles electronically with the $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ software package in the AMS pre-print style and to provide the article in this electronic form for typesetting. While this procedure may not reduce the interval between submission and publication of an article, generally much more accurate copy will be returned for proofreading. Production time for manuscripts prepared with other systems, even $\mathcal{T}\mathcal{E}\mathcal{X}$ itself without $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$, currently prevents cost-effective use of the existing electronic form. Before sending an $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ manuscript for typesetting, contact the AMS Composition department for details.

Manuscripts prepared by some means other than $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$ should be doubled-spaced and produced in the format used by the journal. For journal abbreviations, see the latest *Mathematical Reviews* volume index. An author should submit the original and two copies of the manuscript and retain one copy. The author may suggest an appropriate editor for his paper. It is recommended that the author acquaint himself with the pertinent material contained in "A Manual for Authors of Mathematical Papers," which is available from the American Mathematical Society. All contributions intended for publication and all books for review should be addressed to Walter Gautschi, Chairman, Editorial Committee, Mathematics of Computation, Department of Computer Sciences, Purdue University, West Lafayette, Indiana 47907. The date received, which is published with the final version of an accepted paper, is the date received in the office of the Chairman of the Editorial Committee, and it is the responsibility of the author to submit manuscripts directly to this office.

Each article submitted for publication must be accompanied by a brief and reasonably self-contained abstract, and by 1980 *Mathematics Subject Classification* (1985 *Revision*) numbers. If a list of key words and phrases is included, it will be printed as a footnote on the first page. A list of the classification numbers may be found in the 1984 Subject Index to *Mathematical Reviews*. Authors are also encouraged to supply electronic addresses when available. These will be printed after the postal address at the end of each article.

Copying and Reprinting

Individual readers of this publication, and nonprofit libraries acting for them, are permitted to make fair use of the material, such as to copy an article for use in teaching or research. Permission is granted to quote brief passages from this publication in reviews provided the customary acknowledgment of the source is given.

Republication, systematic copying, or multiple reproduction of any material in this publication (including abstracts) is permitted only under license from the American Mathematical Society. Requests for such permission should be addressed to the Executive Director, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940-6248.

The appearance of the code on the first page of an article in this journal indicates the copyright owner's consent for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law, provided that the fee of \$1.00 plus \$.25 per page for each copy be paid directly to Copyright Clearance Center, Inc., 27 Congress Street, Salem, Massachusetts 01970. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotion purposes, for creating new collective works, or for resale.

New and Recent

REVIEWS VOLUMES

Reviews in Functional Analysis, 1980-86

Introduction by William B. Johnson

4 volumes, 2461 pages, softcover

1989, ISBN 0-8218-0134-1, LC 89-6708

List \$196, Institutional Member \$157,

Individual Member \$118, Reviewer \$98

To order, please specify REVFA/86MC

Reviews in Operator Theory, 1980-86

Introduction by Paul R. Halmos

4 volumes, 2638 pages, softcover

1989, ISBN 0-8218-0135-X, LC 89-6551

List \$196, Institutional Member \$157,

Individual Member \$118, Reviewer \$98

To order, please specify REVOPE/86MC

Special Combination Offer

Reviews in Functional Analysis, 1980-86 and

Reviews in Operator Theory, 1980-86

ISBN 0-8218-0139-2

List \$314, Institutional Member \$251,

Individual Member \$188, Reviewer \$157

To order, please specify REVFAO/86MC

Reviews in Complex Analysis, 1980-86

Introduction by J. J. Kohn and Irwin Kra

4 volumes, 3064 pages, softcover

1989, ISBN 0-8218-0127-9, LC 88-8145

List \$240, Institutional Member \$192,

Individual Member \$144, Reviewer \$120

To order, please specify REVCOM/86MC

Reviews in Global Analysis, 1980-86

Introduction by Anthony J. Tromba

5 volumes, 3920 pages, softcover

1989, ISBN 0-8218-0104-X, LC 88-10565

List \$307, Institutional Member \$246,

Individual Member \$184, Reviewer \$154

To order, please specify REVGLA/86MC

Reviews in Numerical Analysis, 1980-86

Introduction by Gene H. Golub

5 volumes, 2701 pages, softcover

1989, ISBN 0-8218-0102-3, LC 87-25478

List \$261, Institutional Member \$209,

Individual Member \$157, Reviewer \$131

To order, please specify REVNA/86MC

Reviews in Partial Differential Equations, 1980-86

Introduction by Murray H. Protter

5 volumes, 3998 pages, softcover

1989, ISBN 0-8218-0103-1, LC 88-6681

List \$307, Institutional Member \$246

Individual Member \$184, Reviewer \$154

To order, please specify REVPE/86MC

Special Combination Offers

Reviews in Partial Differential Equations, 1980-86

and Reviews in Global Analysis, 1980-86

ISBN 0-8218-0143-0

List \$491, Institutional Member \$393,

Individual Member \$295, Reviewer \$246

To order, please specify REVPG/86MC

Reviews in Partial Differential Equations, 1980-86

and Reviews in Numerical Analysis, 1980-86

ISBN 0-8218-0144-9

List \$453, Institutional Member \$362,

Individual Member \$272, Reviewer \$227

To order, please specify REVNA/86MC

Prepayment required. Review volumes are shipped by surface at no extra charge; contact the AMS Customer Services for air delivery rates. Prices subject to change.

Order from the American Mathematical Society, P. O. Box 1571, Annex Station, Providence, RI 02901-1571 or call toll free 800-321-4AMS (321-4267) (321-4267) in the U. S. and Canada to charge with VISA or MasterCard.





Computational Complexity Theory

Juris Hartmanis, Editor

Computational complexity theory is the study of the quantitative laws that govern computing. During the last 25 years, this field has grown into a rich mathematical theory. Currently one of the most active research areas in computer science, complexity theory is of considerable interest to mathematicians as well, since some of the key open problems in this field raise basic questions about the nature of mathematics. Many experts in complexity theory believe that, in coming decades, the strongest influence on the development of mathematics will come from the extended use of computing and from concepts and problems arising in computer science.

This volume contains the proceedings of the AMS Short Course on Computational Complexity Theory, held at the Joint Mathematics Meetings in Atlanta in January 1988. The purpose of the Short Course was to provide an overview of complexity theory and to describe some of the current developments in the field. The papers presented here represent contributions by some of the top experts in this burgeoning area of research.

Contents:

Juris Hartmanis, Overview of computational complexity theory
Stephen R. Mahaney, The isomorphism conjecture and sparse sets
Ronald V. Book, Restricted relativizations of complexity classes
Neil Immerman, Descriptive and computational complexity
Alan L. Selman, Complexity issues in cryptography
Shafi Goldwasser, Interactive proof systems

1980 Mathematics Subject Classifications: 68, 94
ISBN 0-8218-0131-7, LC 89-6857, ISSN 0160-7634, 128 pages, 1989

Hardcover: List \$33, Inst mem \$26, Indiv mem \$20

Softcover: List \$28, Inst mem \$22, Indiv mem \$17

To order, please specify **PSAPM/38MC (hardcover)**

PSAPMS/38MC (softcover)

**Standing orders are accepted for any book series published by the AMS.
Contact Customer Services at 401-455-4000 or 800-321-4AMS (321-4267) in
the U. S. and Canada for details.**



Prepayment Required. Order from American Mathematical Society, P. O. Box 1571, Annex Station, Providence, RI 02901-1571 or call 800-321-4AMS (321-4267) in the U. S. and Canada to use VISA or MasterCard. All prices subject to change. Shipment will be made by surface. For air delivery, add, 1st book \$5, each additional \$3, maximum \$100.

Chaos and Fractals

The Mathematics Behind the Computer Graphics

Robert L. Devaney and Linda Keen, Editors

This volume contains the proceedings of a highly successful AMS Short Course on Chaos and Fractals, held during the AMS Centennial Celebration in Providence, Rhode Island, in August, 1988.

Chaos and fractals have been the subject of great interest in recent years and have proven to be useful in a variety of areas of mathematics and the sciences. The purpose of the Short Course was to provide a solid introduction to the mathematics underlying the notions of chaos and fractals. The papers in this book range over such topics as dynamical systems theory, Julia sets, the Mandelbrot set, attractors, the Smale horseshoe, calculus on fractals, and applications to data compression.

Aimed at beginning graduate students, college and university mathematics instructors, and non-mathematics researchers, this book provides readable expositions of several exciting topics of contemporary research.

1980 Mathematics Subject Classifications: 58; 30, 51, 34, 39

208 pages, 1989 hardcover

ISBN 0-8218-0137-6, ISSN 0160-7634, LC 89-7003

List \$31, Inst Mem \$25, Indiv Mem \$19

To order, please use order code: **PSAPM/39MC**

Special Combination Book and Videotape Offer

ISBN 0-8218-0142-2

PSAPM/39MC (above) and VIDDEVANEY/MC (below)

List \$70, Inst Mem \$64, Indiv Mem \$58

To order, please use order code: **CHAOSSET/MC**

Now Available through the AMS

CHAOS, FRACTALS AND DYNAMICS: Computer Experiments in Mathematics

with Robert Devaney

A Science Television Production

In this captivating and richly illustrated videotape, Robert Devaney communicates his deep understanding as well as his enthusiasm for chaos, fractals, and dynamical systems. As an instructional tool, this videotape will be particularly useful because it describes a current area of intense mathematical activity. Though the mathematical background required is elementary, those at the collegiate level and beyond will appreciate this videotape for the clarity of exposition and the sheer beauty of the graphics.

1980 Mathematics Subject Classification: 58 VHS format, approx one hour, 1989

Price \$59 To order, please use order code: **VIDDEVANEY/MC**



All prices subject to change. Shipment will be made by surface. For air delivery add, 1st book \$5, each additional book \$3, maximum \$100. Prepayment required.

Order from American Mathematical Society, P. O. Box 1571, Annex Station, Providence, RI 02901-1571, or call toll free 800-321-4AMS (321-4267) in the U. S. and Canada to charge with VISA or MasterCard.



CATEGORIES IN COMPUTER SCIENCE AND LOGIC

John W. Gray and Andre Scedrov, Editors

Category theory has had important uses in logic since the invention of topos theory in the early 1960s, and logic has always been an important component of theoretical computer science. A new development has been the increase in direct interactions between category theory and computer science. In June 1987, an AMS-IMS-SIAM Summer Research Conference on Categories in Computer Science and Logic was held at the University of Colorado in Boulder. The aim of the conference was to bring together researchers working on the interconnections between category theory and computer science or between computer science and logic. The conference emphasized the ways in which the general machinery developed in category theory could be applied to specific questions and be used for category-theoretic studies of concrete problems. This volume represents the proceedings of the conference. (Some of the participants' contributions have been published elsewhere.)

The papers published here relate to three different aspects of the conference. The first concerns topics relevant to all three fields, including, for example, Horn logic, lambda calculus, normal form reductions, algebraic theories, and categorical models for computability theory. In the area of logic, topics include semantical approaches to proof-theoretical questions, internal properties of specific objects in (pre-) topoi and their representations, and categorical sharpening of model theoretic notions. Finally, in the area of computer science, the use of category theory in formalizing aspects of computer programming and program design is discussed.

1980 Mathematics Subject Classifications: 68, 18, 03
ISBN 0-8218-5100-4, LC 89-32893, ISSN 0271-4132
382 pages, softcover, 1989
List \$42, Inst mem \$34, Indiv mem \$25
To order, please specify CONM/92MC

Other Books of Interest

A Formalization of Set Theory without Variables
by Alfred Tarski and Steven Givant
List \$64, Inst mem \$51, Indiv mem \$38
To order, please specify COLL/41MC

Logic and Combinatorics
Stephen G. Simpson, Editor
List \$40, Inst mem \$32, Indiv mem \$24
To order, please specify CONM/65MC

Order from: American Mathematical Society, Annex Station, P. O. Box 1571, Providence, RI 02901-1571. *Prepayment is required.*
Or call 800-321-4AMS (321-4267) in the U. S. and Canada to use VISA or MasterCard. Free shipment by surface. For air delivery, please add \$5 first book, \$3 each additional, \$100 maximum.

(Continued from back cover)

| | |
|---|-----|
| Richard Blecksmith, John Brillhart, and Irving Gerst , On the mod 2 Recipro- cation of Infinite Modular-Part Products and the Parity of Certain Partition Functions..... | 345 |
| P. B. Borwein and T. A. Loring , Some Questions of Erdős and Graham on Numbers of the Form $\sum g_n/2^{g_n}$ | 377 |
| Graeme L. Cohen , On an Integer's Infinitary Divisors | 395 |
| Bas Edixhoven, Arnold de Groot, and Jaap Top , Elliptic Curves Over the Rationals with Bad Reduction at Only One Prime..... | 413 |
| Wieb Bosma , Approximation by Mediants | 421 |
| Victor Shoup , New Algorithms for Finding Irreducible Polynomials Over Finite Fields | 435 |
| M. Denert , The Genus Zeta Function of Hereditary Orders in Central Simple Algebras Over Global Fields | 449 |
| Bettina Just , Integer Relations Among Algebraic Numbers | 467 |
| Reviews and Descriptions of Tables and Books | 479 |
| Zwillinger 1, Dagpunar 2, Chan, Glowinski, Periaux, and Widlund, Editors 3, Elliott and Hoare, Editors 4 | |
| Microfiche Supplement | |
| Ian H. Sloan and Linda Walsh , Computer Search of Rank-2 Lattice Rules for Multidimensional Quadrature | |

MATHEMATICS OF COMPUTATION
TABLE OF CONTENTS

January 1990

| | |
|--|-----|
| Manil Suri , On the Stability and Convergence of Higher-Order Mixed Finite Element Methods for Second-Order Elliptic Problems | 1 |
| Christine Bernardi, Naïma Debit, and Yvon Maday , Coupling Finite Element and Spectral Methods: First Results | 21 |
| Zi-Cai Li and Rudolf Mathon , Error and Stability Analysis of Boundary Methods for Elliptic Problems with Interfaces | 41 |
| Ricardo G. Durán and Ricardo H. Nochetto , Weighted inf-sup Condition and Pointwise Error Estimates for the Stokes Problem | 63 |
| Gerard R. Richter , A Finite Element Method for Time-Dependent Convection-Diffusion Equations | 81 |
| Claes Johnson, Anders Szepessy, and Peter Hansbo , On the Convergence of Shock-Capturing Streamline Diffusion Finite Element Methods for Hyperbolic Conservation Laws | 107 |
| Takuya Tsuchiya , A Note on Discrete Solutions of the Plateau Problem . | 131 |
| Yi Yan , The Collocation Method for First-Kind Boundary Integral Equations on Polygonal Regions | 139 |
| Yuan Wei and Tang Tao , The Numerical Analysis of Implicit Runge-Kutta Methods for a Certain Nonlinear Integro-Differential Equation | 155 |
| Charles K. Chui and Tian-Xiao He , Bivariate C^1 Quadratic Finite Elements and Vertex Splines | 169 |
| Giuseppe Buffoni , Nonnegative and Skew-Symmetric Perturbations of a Matrix with Positive Inverse | 189 |
| Takemitsu Hasegawa, Tatsuo Torii, and Hiroshi Sugiura , An Algorithm Based on the FFT for a Generalized Chebyshev Interpolation | 195 |
| W. R. Madych and S. A. Nelson , Multivariate Interpolation and Conditionally Positive Definite Functions. II | 211 |
| J. Carnicer and M. Gasca , Evaluation of Multivariate Polynomials and Their Derivatives | 231 |
| Qazi I. Rahman and Gerhard Schmeisser , Quadrature Formulae and Functions of Exponential Type | 245 |
| Philip Rabinowitz , Generalized Noninterpolatory Rules for Cauchy Principal Value Integrals | 271 |
| Ian H. Sloan and Linda Walsh , A Computer Search of Rank-2 Lattice Rules for Multidimensional Quadrature | 281 |
| Harald Niederreiter and Ian H. Sloan , Lattice Rules for Multiple Integration and Discrepancy | 303 |
| Alan E. Berger , Accurate Calculation of Functions Used in a Model of the Nematic Behavior of Self-Assembling Systems | 313 |
| George S. Fishman , Multiplicative Congruential Random Number Generators with Modulus 2^β : An Exhaustive Analysis for $\beta = 32$ and a Partial Analysis for $\beta = 48$ | 331 |