

## Editorial Information

As of March 31, 1997, the backlog for this journal was approximately 1 issue. This estimate is the result of dividing the number of manuscripts for this journal in the Providence office that have not yet gone to the printer on the above date by the average number of articles per issue over the previous twelve months, reduced by the number of issues published in six months (the time necessary for editing and composing a typical issue).

A Consent to Publish and Copyright Agreement is required before a paper will be published in this journal. By submitting a paper to this journal, authors certify that the results have not been submitted to nor are they under consideration for publication by another journal, conference proceedings, or similar publication.

## Information for Authors

**Initial submission.** An author should submit three paper copies of the manuscript. Initial submission by e-mail is not allowed. The author may suggest an appropriate editor for his paper. All contributions intended for publication and all books for review should be addressed to Lars B. Wahlbin, Managing Editor, Mathematics of Computation, Center for Applied Mathematics, 657 Frank H. T. Rhodes Hall, Cornell University, Ithaca, NY 14853-3801. The date received, which is published with the final version of an accepted paper, is the date received in the office of the Managing Editor, and it is the responsibility of the author to submit manuscripts directly to this office.

The first page must consist of a *descriptive title*, followed by an *abstract* that summarizes the article in language suitable for workers in the general field (algebra, analysis, etc.). The *descriptive title* should be short, but informative; useless or vague phrases such as “some remarks about” or “concerning” should be avoided. The *abstract* must be brief and reasonably self-contained. Included with the footnotes to the paper, there should be the 1991 *Mathematics Subject Classification* representing the primary and secondary subjects of the article. This may be followed by a list of *key words and phrases* describing the subject matter of the article and taken from it. A list of classifications may be found in the annual index of *Mathematical Reviews*, published with the December issue starting in 1990. Journal abbreviations used in bibliographies are also listed in the latest *Mathematical Reviews* annual index. The classifications and the journal abbreviations are accessible from e-MATH via the World Wide Web through the URL <http://www.ams.org/committee/publications/mr-info.html> or via FTP to [e-math.ams.org](mailto:e-math.ams.org) (login as anonymous and enter username as password). The classifications are available as a browsable list and the journal abbreviations are available through a search tool. When the manuscript is submitted, authors should supply the editor with electronic addresses if available. These will be printed after the postal address at the end of each article.

**Electronically prepared manuscripts.** For the final submission of accepted papers, the AMS encourages use of electronically prepared manuscripts, with a strong preference for  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}^{\mathcal{A}}\mathcal{T}\mathcal{E}\mathcal{X}$  submissions. To this end, the Society has prepared  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}^{\mathcal{A}}\mathcal{T}\mathcal{E}\mathcal{X}$  author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, the *AMS Author Handbook*, samples, and a style file that generates the particular design specifications of that publication series. Articles properly prepared using the  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}^{\mathcal{A}}\mathcal{T}\mathcal{E}\mathcal{X}$  style file automatically provide hypertext linking to the bibliography and other elements of the article for searching electronically on the World Wide Web. Because linking must often be added manually to submissions in other forms of  $\mathcal{T}\mathcal{E}\mathcal{X}$ , using  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}^{\mathcal{A}}\mathcal{T}\mathcal{E}\mathcal{X}$  also reduces the amount of technical intervention once the files are received by the AMS. This results in fewer errors in processing and saves the author proofreading time.  $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}^{\mathcal{A}}\mathcal{T}\mathcal{E}\mathcal{X}$  papers also move more efficiently through the production stream, helping to minimize publishing costs.

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technical time required to insure that the file will run properly through the AMS in-house production system.  $\LaTeX$  users will find that  $\AMS\text{-}\LaTeX$  is the same as  $\LaTeX$  with additional commands to simplify the typesetting of mathematics, and users of plain  $\TeX$  should have little difficulty learning  $\AMS\text{-}\LaTeX$ .

Authors may retrieve an author package from e-MATH via the World Wide Web through the URL <http://www.ams.org/tex/> or via FTP to [e-math.ams.org](ftp://e-math.ams.org) (login as `anonymous` and enter username as password). The author package can also be obtained free of charge by sending e-mail to [pub@ams.org](mailto:pub@ams.org) (Internet) or from the Publication Division, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. When requesting an author package, please specify  $\AMS\text{-}\LaTeX$  or  $\AMS\text{-}\TeX$ , Macintosh or IBM (3.5) format, and the publication in which your paper will appear. Please be sure to include your complete mailing address.

The final version of the electronic manuscript should be sent to the Providence office immediately after the paper has been accepted for publication. The author should also send the final version of the paper manuscript to the Managing Editor, who will forward a copy to the Providence office. Editors will require authors to send their electronically prepared manuscripts to the Providence office in a timely fashion. Electronically prepared manuscripts can be sent via e-mail to [pub-submit@ams.org](mailto:pub-submit@ams.org) (Internet) or on diskette to the Electronic Prepress Department, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. When submitting an electronic manuscript, please be sure to include a message indicating in which publication the paper has been accepted. No corrections will be accepted electronically. Authors must mark their changes on their proof copies and return them to the Providence office. Complete instructions on how to submit files are included in the author package.

**Electronic graphics.** Figures may be submitted to the AMS in an electronic format. The AMS recommends that graphics created electronically be saved in Encapsulated PostScript (EPS) format. This includes graphics originated via a graphics application as well as scanned photographs or other computer-generated images.

If the graphics package used does not support EPS output, the graphics file should be saved in one of the standard graphics formats—such as TIFF, PICT, GIF, etc.—rather than in an application-dependent format. Graphics files submitted in an application-dependent format are not likely to be used. No matter what method was used to produce the graphic, it is necessary to provide a paper copy to the AMS.

Authors using graphics packages for the creation of electronic art should also avoid the use of any lines thinner than 0.5 points in width. Many graphics packages allow the user to specify a “hairline” for a very thin line. Hairlines often look acceptable when proofed on a typical laser printer. However, when produced on a high-resolution laser imagesetter, hairlines become nearly invisible and will be lost entirely in the final printing process.

Screens should be set to values between 15% and 85%. Screens which fall outside of this range are too light or too dark to print correctly.

**$\TeX$  files available.** Beginning with the January 1992 issue of the *Bulletin* and the January 1996 issues of *Transactions*, *Proceedings*, *Mathematics of Computation*, and the *Journal of the AMS*,  $\TeX$  files can be downloaded from e-MATH, starting from URL <http://www.ams.org/journals/>. Authors without Web access may request their files at the address given below after the article has been published. For *Bulletin* papers published in 1987 through 1991 and for *Transactions*, *Proceedings*, *Mathematics of Computation*, and the *Journal of the AMS* papers published in 1987 through 1995,  $\TeX$  files are available upon request for authors without Web access by sending e-mail to [file-request@ams.org](mailto:file-request@ams.org) or by contacting the Electronic Prepress Department, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. The request should include the title of the paper, the name(s) of the author(s), the name of the publication in which the paper has or will appear, and the volume and issue numbers if known. The  $\TeX$  file will be sent to the author making the request after the article goes to the printer. If the requestor can receive Internet e-mail, please include the e-mail address to which the file should be sent. Otherwise please indicate a diskette format and postal address to which a disk

should be mailed. **Note:** Because  $\text{\TeX}$  production at the AMS sometimes requires extra fonts and macros that are not yet publicly available,  $\text{\TeX}$  files cannot be guaranteed to run through the author's version of  $\text{\TeX}$  without errors. The AMS regrets that it cannot provide support to eliminate such errors in the author's  $\text{\TeX}$  environment.

Any inquiries concerning a paper that has been accepted for publication should be sent directly to the Electronic Prepress Department, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248.

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# American Mathematical Society

## Recently Published Titles from the AMS

### Descriptive Complexity and Finite Models

Neil Immerman, *University of Massachusetts, Amherst*, and Phokion G. Kolaitis, *University of California, Santa Cruz*, Editors

*We hope that this small volume will suggest directions of study and contact for future researchers to build upon, creating connections and making discoveries that will help explain some of the many mysteries of computation*

—from the Preface

Finite model theory can be succinctly described as the study of logics on finite structures. It is an area of research existing between mathematical logic and computer science. This area has been developing through continuous interaction with computational complexity, database theory, and combinatorics.

The volume presents articles by leading researchers who delivered talks at the "Workshop on Finite Models and Descriptive Complexity" at Princeton in January 1996 during a DIMACS sponsored Special Year on Logic and Algorithms. Each article is self-contained and provides a valuable introduction to the featured research areas connected with finite model theory.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 31, 1997, 248 pages, Hardcover, ISBN 0-8218-0517-7, List \$55, Individual member \$33, Order code DIMACS-31MC

### An Introduction to Infinite Ergodic Theory

Jon Aaronson, *Tel Aviv University, Israel*

Infinite ergodic theory is the study of measure preserving transformations of infinite measure spaces. The book focuses on properties specific to infinite measure preserving transformations.

The work begins with an introduction to basic non-singular ergodic theory, including recurrence behavior, existence of invariant measures, ergodic theorems, and spectral theory. A wide range of possible "ergodic behavior" is catalogued in the third chapter mainly according to the yardsticks of intrinsic normalizing constants, laws of large numbers, and return sequences. The rest of the book consists of illustrations of these phenomena, including Markov maps, inner functions, and cocycles and skew products. One chapter presents a start on the classification theory.

Mathematical Surveys and Monographs, Volume 59, 1997, 284 pages, Hardcover, ISBN 0-8218-0391-1, List \$70, Individual member \$47, Order code SURV-59MC

### Journal of the Ramanujan Mathematical Society

V. Kumar Murty, *University of Toronto, ON, Canada*, Kapil Paranjape, *Institute of Mathematical Sciences, Madras, India*, R. Parimala, *Tata Institute of Fundamental Research, Bombay, India*, Dipendra Prasad, *Melha Research Institute, Allahabad, India*, and V. S. Sunder, *Institute of Mathematical Sciences, Madras, India*, Editors

In 1997, the *Journal of the Ramanujan Mathematical Society* takes on a new look. With a freshly consti-

tuted Editorial Board containing some of the best young mathematicians from India, the journal is sure to be of significant interest to a wide spectrum of the mathematical public. The journal is dedicated to publishing high-quality original papers in all areas of mathematics. One volume of two numbers is published each year. Backlog will be kept to a minimum so as to ensure timely publication. Printed format

Published by the Ramanujan Mathematical Society and distributed worldwide by the AMS (outside of India)

ISSN 0970-1249, 1997 Subscription List \$90, All Individuals \$25, Order code 970RMSAC

### Robert Steinberg Collected Papers

Robert Steinberg, *University of California, Los Angeles*

This volume is a collection of published papers by Robert Steinberg. It contains all of his published papers on group theory, including those on "special representations" (now called Steinberg representations), tensor products of representations, finite reflection groups, regular elements of algebraic groups, Galois cohomology, universal extensions, etc. At the end of the book, there is a section called "Comments on the Papers". The comments by Steinberg explain how ideas and results have evolved and been used since they first appeared.

Collected Works, Volume 7, 1997, 599 pages, Hardcover, ISBN 0-8218-0576-2, List \$79, Individual member \$47, Order code CWORKS/7MC

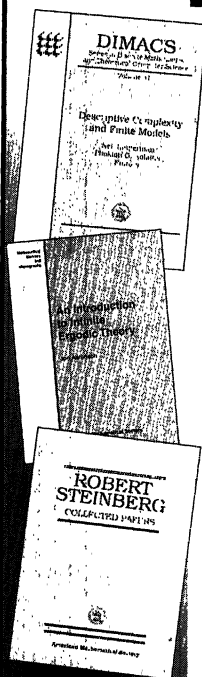
### The SPIN Verification System

Jean-Charles Grégoire, *INRS-Telecommunications, Montreal, PQ, Canada*, and Gerard J. Holzmann and Doron A. Peled, *Lucent Technologies, Murray Hill, NJ*, Editors

What is SPIN? SPIN is a general tool for the specification and formal verification of software for distributed systems. It has been used to detect design errors in a wide range of applications, such as abstract distributed algorithms, data communications protocols, operating systems code, and telephone switching code. The verifier can check for basic correctness properties, such as absence of deadlock and race conditions, logical completeness, or unwarranted assumptions about the relative speeds of processes. It can also check for more subtle, system dependent correctness properties expressed in the syntax of Linear-time Temporal Logic (LTL). The tool translates LTL formulae automatically into automata representations, which can be used in an efficient on-the-fly verifications procedure.

This DIMACS volume presents the papers contributed to the second international workshop that was held on the SPIN verification system at Rutgers University in August 1996. The work covers theoretical and foundational studies of formal verification, empirical studies of the effectiveness of different types of algorithms, significant practical applications of the SPIN verifier, and discussions of extensions and revisions of the basic code.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 32, 1997, 203 pages, Hardcover, ISBN 0-8218-0650-7, List \$49, Individual member \$29, Order code DIMACS-32MC



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# American Mathematical Society

## Recently Published Titles from the AMS

### Basic Partial Differential Equations

David Bleecker and George Csordas, *University of Hawaii, Honolulu*

This undergraduate text is self-contained for students who have had three semesters of calculus. No previous course in ordinary differential equations or linear algebra is necessary. Nevertheless, rigorous proofs of nearly all results are given after ample physical motivation. In particular, students can read and understand the proofs of the maximum principles for solutions of the heat and Laplace equations, along with results on the continuous dependence of solutions with respect to variation of initial and boundary data. Moreover, complete proofs of convergence theorems (e.g., pointwise and uniform) for Fourier series are provided.

This book is for those who believe that a PDE course should do more than disseminate facts and recipes. However, it easily accommodates different levels of rigor which instructors may deem more appropriate for their students. Besides all of the standard topics, there is coverage of traffic flow shocks, evolution of population densities, minimal surfaces, gravitation, quantum mechanics of the hydrogen atom, and vibrations of round drums, spheres and manifolds.

There are approximately 280 examples worked out in detail, and 600 exercises ranging from routine to quite challenging. All graphs of mathematical functions or one or several variables were computer generated including surfaces of various spherical harmonics, Bessel functions, and nodal curves for vibrating drums. There is a solutions manual with complete solutions (including many interesting steps and calculations) to all but the most straightforward problems.

*Mathematical Pre-publications* are distributed worldwide except in Japan by the American Mathematical Society.

International Press, 1996. 737 pages. Hardcover, ISBN 1-57146-036-5. List \$49. All AMS members \$34. Order code INPR-233K.

### Introduction to Probability Second Revised Edition

Charles M. Grinstead, *Swarthmore College, PA*, and J. Laurie Snell, *Dartmouth College, Hanover, NH*

This text is designed for an introductory probability course at the university level for sophomores, juniors and seniors in mathematics, the physical and social sciences, engineering, and computer science. It presents a thorough treatment of probability ideas and techniques necessary for a firm understanding of the subject.

The text is also recommended for use in discrete probability courses. The material is organized so that the discrete and continuous probability discussions are presented in a separate, but parallel, manner. This organization does not emphasize an overly rigorous or formal view of probability and therefore offers some strong pedagogical value. Hence, the discrete discussions can sometimes serve to motivate the more abstract continuous probability discussions.

#### Features:

- Key ideas are developed in a somewhat leisurely style, providing a variety of interesting applications to probability and showing some nonintuitive ideas.

- Over 600 exercises provide the opportunity for practicing skills and developing a sound understanding of ideas.
- Text includes many computer programs that illustrate the algorithms or the methods of computation for important problems.

1997. 484 pages. Hardcover, ISBN 0-8218-0749-8. List \$49. All AMS members \$39. Order code HPROBMC.

### Multidimensional Complex Analysis and Partial Differential Equations

Paulo D. Cordaro, *IME USP, São Paulo, Brazil*, and Howard Jacobowitz, *Rutgers University, Camden, NJ*, Editors

This collection of papers by outstanding contributors in analysis, partial differential equations, and several complex variables is dedicated to Professor François Trèves in honor of his 65th birthday. There are five important survey articles covering analytic singularities, holomorphically nondegenerate algebraic hypersurfaces, analyticity of CR mappings, removable singularities of vector fields, and local solvability for systems of vector fields. The other papers are original research contributions on topics such as Klem-Gordon and Dirac equations, looplift operators, elliptic structures, complexification of Lie groups, pseudo differential operators, nonlinear equations, CR and Mizohata structures, analytic hypoellipticity, overdetermined systems, and group invariant convex hypersurfaces.

Contemporary Mathematics, Volume 205, 1997. 276 pages. Softcover, ISBN 0-8218-0539-6. List \$55. Individual member \$35. Order code CONM-205MC.

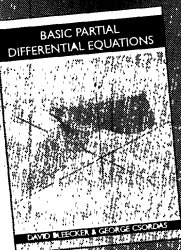
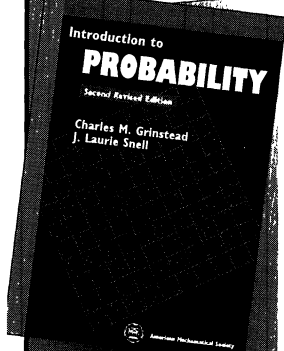
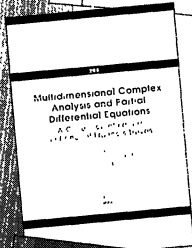
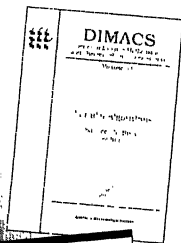
### Parallel Algorithms

Sandeep N. Bhatt, *Bell Communications Research, Morristown, NJ*, Editor

This volume is the result of the Third DIMACS Implementation Challenge that was conducted as part of the 1993-1994 special year on Parallel Algorithms. The Implementation Challenge was formulated in order to provide a forum for a concerted effort to study effective algorithms for combinatorial problems and to investigate opportunities for massive speedups on parallel computers. The challenge included two problem areas for research study: tree searching algorithms, used in game search and combinatorial optimization, for example, and algorithms for sparse graphs.

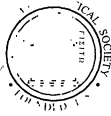
Participants at sites in the U.S. and Europe undertook projects from November 1993 through October 1994. The workshop was held at DIMACS in November 1994. Participants were encouraged to share test results, to rework their implementations considering feedback at the workshop, and to submit a final report for the proceedings. Nine papers were selected for this volume.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 30, 1997. 162 pages. Hardcover, ISBN 0-8218-0447-2. List \$45. Individual member \$27. Order code DIMACS-30MC.



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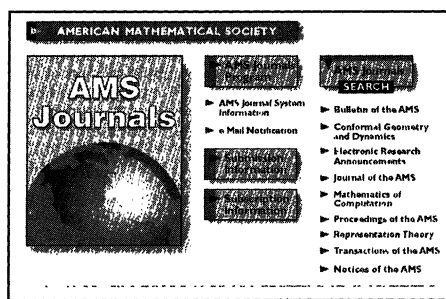
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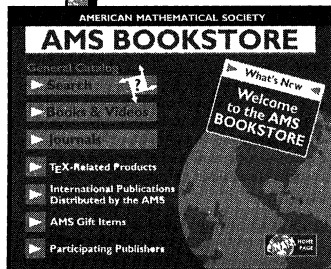
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