As of March 31, 1996, 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 (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 in $\mathcal{A}_{\mathcal{M}} \mathcal{S}-\mathrm{T}_{\mathrm{E}} \mathrm{X}$ or $\mathcal{A}_{\mathcal{M}} \mathcal{S}$ ${ }^{\mathrm{LA}} \mathrm{T}_{\mathrm{E}} \mathrm{X}$; properly prepared electronic manuscripts save the author proofreading time and move more quickly through the production process. To this end, the Society has prepared author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, the $A M S$ Author Handbook, samples, and a style file that generates the particular design specifications of that publication series for both $\mathcal{A}_{\mathcal{M}} \mathcal{S}-\mathrm{TeX}$ and $\mathcal{A} \mathcal{M}$ - $-\mathrm{EAT}_{\mathrm{E}} \mathrm{X}$.

Those authors who make use of these style files from the beginning of the writing process will further reduce their own efforts. Electronically submitted manuscripts prepared in plain $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ or $\mathrm{IAT}_{\mathrm{E}} \mathrm{X}$ are normally not acceptable due to the high amount of technical time required to insure that the file will run properly through the AMS in-house production system. Users of plain $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ should have little difficulty learning $\mathcal{A}_{\mathcal{M}} \mathcal{S}-\mathrm{T}_{\mathrm{E}} \mathrm{X}$, and $\mathrm{E}_{\mathrm{E}} \mathrm{T}_{\mathrm{E}} \mathrm{X}$ users will find that $\mathcal{A} \mathcal{M}$ S-EAEX is the same as $\mathrm{IATEX}_{\mathrm{E}}$ with additional commands to simplify the typesetting of mathematics.

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 (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 (Internet) or from the Publication Division, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. When requesting an author package, please specify $\mathcal{A} \mathcal{M} \mathcal{S}-\mathrm{T}_{\mathrm{E}} \mathrm{X}$ or $\mathcal{A}_{\mathcal{M}} \mathcal{S}$ - $\mathrm{EAT}_{\mathrm{E}} \mathrm{X}$, 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 (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 applicationdependent 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.
$\mathbf{T}_{\mathbf{E}} \mathbf{X}$ 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 $A M S, \mathrm{~T}_{\mathrm{E}} \mathrm{X}$ files can be downloaded from e-MATH, starting from URL http://www.ams.org/journals/. For Bulletin papers published in 1987 through 1991 and for Transactions, Proceedings, Mathematics of Computation, and the Journal of the $A M S$ papers published in 1987 through 1995, $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ files are available upon request by sending e-mail to 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 $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ 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 $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ production at the AMS sometimes requires extra fonts and macros that are not yet publicly available, $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ files cannot be guaranteed to run through the author's version of $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ without errors. The AMS regrets that it cannot provide support to eliminate such errors in the author's $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ 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.

## Editorial Committee

ANDREW M. ODLYZKO, AT\&T Bell Laboratories, 600 Mountain Avenue, Murray Hill, NJ 07974; E-mail: amo@research.att.com

STANLEY OSHER, Department of Mathematics, University of California, Los Angeles, CA 90024; E-mail: sjo@math.ucla.edu
G. W. STEWART, Department of Computer Science, University of Maryland, College Park, MD 20742; E-mail: stewart@thales.cs.umd.edu

LARS B. WAHLBIN, Chairman. Center for Applied Mathematics, 657 Frank H. T. Rhodes Hall, Cornell University, Ithaca, NY 14853-3801; E-mail: awahlbin@cam. cornell. edu

## Board of Associate Editors

JAMES H. BRAMBLE, Department of Mathematics, Texas A \& M University, College Station, TX 77843-3368; E-mail: bramble@math.tamu.edu

SUSANNE C. BRENNER, Department of Mathematics, University of South Carolina, Columbia, SC 29208; E-mail: brenner@math.sc.edu

HOWARD ELMAN, Department of Computer Science, University of Maryland, College Park, MD 20742; E-mail: elman@cs.umd.edu

RICHARD S. FALK, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903-2101; E-mail: falk@math.rutgers.edu

WALTER GAUTSCHI, Department of Computer Sciences, Purdue University, West Lafayette, IN 47907; E-mail: wxg@cs.purdue.edu

DANIEL W. LOZIER, Applied and Computational Mathematics Division, National Institute of Standards and Technology, Gaithersburg, MD 20899-0001; E-mail: dlozier@ nist.gov

JAMES N. LYNESS, Mathematics and Computer Science Division, Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439; E-mail: lyness@mcs.anl.gov

HARALD NIEDERREITER, Institute for Information Processing, Austrian Academy of Sciences, Sonnenfelsgasse 19, A-1010 Vienna, Austria; E-mail: nied@qiinfo.oeaw. ac.at

SYVERT P. NØRSETT, Division of Numerical Mathematics, The University of Trondheim and The Norwegian Institute of Technology, Alfred Getz vei 1, N-7034 TrondheimNTH, Norway; E-mail: norsett@imf.unit.no

JOHN E. OSBORN, Department of Mathematics, University of Maryland, College Park, MD 20742; E-mail: jeo@julia.umd.edu

CARL POMERANCE, Department of Mathematics, The University of Georgia, Athens, GA 30602; E-mail: carl@math.uga.edu

RENÉ SCHOOF, Dipartimento di Matematica, $2^{a}$ Università di Roma "Tor Vergata", I-00133 Roma, Italy; E-mail: schoof@volterra.science.unitn.it; and schoof@fwi. uva.nl
L. RIDGWAY SCOTT, Department of Mathematics, University of Houston, Houston, TX 77204-3476; E-mail: scott@casc.math.uh.edu

DANIEL SHANKS, Department of Mathematics, University of Maryland, College Park, MD 20742; E-mail: dns@gaby.umd.edu

CHI-WANG SHU, Applied Mathematics Division, Brown University, Providence, RI 02912-0001; E-mail: shu@cfm.brown.edu

FRANK STENGER, Department of Computer Science, University of Utah, Salt Lake City, UT 84112; E-mail: stenger@cs.utah.edu

HANS J. STETTER, Institut für Numerische Mathematik, Technische Universität Wien, Wiedner Hauptstrasse 6-10, A-1040, Wien, Austria; E-mail: stetter@uranus. tuwien.ac.at

NICO M. TEMME, Stichting Mathematisch Centrum, Centrum voor Wiskunde en Informatica, Kruislaan 413, 1098 SJ Amsterdam, The Netherlands; E-mail: nicot@cwi.nl

VIDAR THOMÉE, Mathematics Department, Chalmers University of Technology, S41296 Göteborg, Sweden; E-mail: thomee@math.chalmers.se

JOSEPH D. WARD, Department of Mathematics, Texas A \& M University, College Station, TX 77843-3368; E-mail: jward@math.tamu.edu

HUGH C. WILLIAMS, Department of Computer Science, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2; E-mail: Hugh_Williams@csmail.cs.umanitoba.ca

JOHN W. WRENCH, JR., 102 Mt. Olivet Boulevard, Frederick, MD 21701
STEPHEN J. WRIGHT, Mathematics and Computer Science Division, Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439; E-mail: wright@mcs.anl.gov


## American Mathematical Society

## New Titles

## Introduction to Intersection Theory in Algebraic Geometry William Fulton, Inivicressily of Chicago, II

This book presents expository lectures from the (BMS regional conterence held at (reorge Mason Lnisersits during the summer of l983. Thas volume has been repronted by the $+1 / 15$ with uplates and corrections. In the work, fulton gites references to many further developinents in the fied



## Selected Papers of Freeman Dyson with Commentary Treeman Dyson, listitule for Adiduced Sthly, Princolon, $\mathrm{N}^{\prime}$ )



-from the Foreworl by L.lliott Lieb

 ()rder code ( $W$ )RKん;

## Cliques, Coloring, and Satisfiability

David S. Johnson, AT \& T Bell I aborutories, Murray Hill, NJ, and Michael A. Trick, Carnegic Mellon LInierosily, Pillshurgh. I'A, Editors
Addresed here are three difficult combmatorial optmiation problems: tinding clicues in a graph, coloring the verticen of a graph, and solving instancen of the satist iability problem. "There problems were chosen both for their practical interest and because of their theoretical intractabilits.
DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, \olumur 26, $10 \%$, 67 pagen


## Multiplicative Galois Module Structure

A. Weiss, Lniteresity of Alberta, Filmonton, AB, Cmada

This book is the result of a hort course on the (alois structure of $S$-units that was given at the Fields Institute in the tall of 1993. Offering a new angle on an old problem, the main theme is that this structure should be determined by clase field theory; in its cohomological form, and be the behavior of Artin $I$-functions at $s=0$. 7 he work brings together the current ex idence that the Galois structure of $S$-tunits can be described.
 member 423. Ouder code ITAT TIN

## Enveloping Algebras

Jacques Dixmier, Puris, trance

 -Mathematical Reviews
Written with unigue precison and elegance, the book provides the reader with insight and undersianding of tha sery mportant subject. It can be a very useful source of references in the theory of unis ersal envelopmg algebras, the area of mathemation that remains as important today a a it was 20 vars ago. For the 1996 printing the author updated the statua of open problems and added some relevant references.
 membernati. Order code (bll IING

## Quantization, Nonlinear Partial Differential Equations, and Operator Algebra

William Arveson, Unirersil! of California, Berkelcy, Thomas Branson, Lnizersity of Iozera, lower Cily, and Irving Segal, Masachuscots Inslitute of 'Technology. Combridge
Nost of the developments in this volume appear in book form for the first time. The resulting work is a concire and informative was to explore the field and the spectrum of methods arailable to its int ertigation



[^0]

## (Continued from back cover)

Walter Gautschi and Sotirios E. Notaris, Stieltjes polynomials and related quadrature formulae for a class of weight functions ..... 1257
Dimitar K. Dimitrov, Integration of polyharmonic functions ..... 1269
B.G.S. Doman, An asymptotic expansion for the incomplete beta function ..... 1283
A. J. W. Duijvestijn, The number of polyhedral (3-connected planar) graphs ..... 1289
Harvey Cohn and John McKay, Spontaneous generation of modular invariants ..... 1295
Johannes Buchmann and Victor Shoup, Constructing nonresidues in finite fields and the extended Riemann hypothesis ..... 1311
Wieb Bosma and Peter Stevenhagen, Density computations for real quadratic units ..... 1327
Takashi Fukuda, Cyclotomic units and Greenberg's conjecture for real quadratic fields ..... 1339
A. Y. Cheer and D. A. Goldston, Turán's pure power sum problem ..... 1349
A.J.W. Duijvestijn, Simple perfect squared squares and $2 \times 1$ squared rectangles of order 26 ..... 1359
Reviews and Descriptions of Tables and Books ..... 1365
Křižek, Neittaanmäki, and Stenberg, Editors 29, Vasil'eva, Butuzov, and Kalachev 30, Cohen, Editor 31, Coombes, Hunt, Lipsman, Osborn, and Stuck 32, Briggs and Henson 33, Lau 34, Zahar, Editor 35, Lidl and Niederreiter 36, Riesel 37
Table Errata ..... 1379Weber 618, Prudnikov, Brychkov, and Marichev 619, Prudnikov,Brychkov, and Marichev 620, Prudnikov, Brychkov, and Marichev621, Erdélyi, Editor, Magnus, Oberhettinger, and Tricomi, researchassociates 622, Erdélyi, Editor, Magnus, Oberhettinger, and Tricomi,research associates 623, Erdélyi, Editor, Magnus, Oberhettinger, andTricomi, research associates 624, Oberhettinger 625, Apelblat 626

# MATHEMATICS OF COMPUTATION <br> CONTENTS 

Susanne C. Brenner, Two-level additive Schwarz preconditioners for nonconforming finite element methods ..... 897
Peter Oswald, Preconditioners for nonconforming discretizations ..... 923
Yuanhua Deng, Goong Chen, Wei-Ming Ni, and Jianxin Zhou, Boundary element monotone iteration scheme for semilinear elliptic partial differential equations ..... 943
Rob Stevenson, The frequency decomposition multilevel method: A robust additive hierarchical basis preconditioner ..... 983
M. Vanmaele and R. Van Keer, On a variational approximation method for a class of elliptic eigenvalue problems in composite structures ..... 999
Matgorzata Peszyńska, Finite element approximation of diffusion equations with convolution terms ..... 1019
Jie Shen, On error estimates of the projection methods for the Navier-Stokes equations: Second-order schemes ..... 1039
Johan F. Malmliden and N. Anders Petersson, A fast iterative method to compute the flow around a submerged body ..... 1067
Guangfu Sun and Martin Stynes, A uniformly convergent method for a singularly perturbed semilinear reaction-diffusion problem with multiple solutions ..... 1085
Petr Klouček, Bo Li And Mitchell Luskin, Analysis of a class of nonconforming finite elements for crystalline microstructures ..... 1111
Hailiang Liu and Jinghua Wang, Nonlinear stability of stationary discrete shocks for nonconvex scalar conservation laws ..... 1137
Sebastian Noelle, A note on entropy inequalities and error estimates for higher-order accurate finite volume schemes on irregular families of grids ..... 1155
S. N. Papakostas and G. Papageorgiou, A family of fifth-order Runge- Kutta pairs ..... 1165
Anwei Liu and Barry Joe, Quality local refinement of tetrahedral meshes based on 8 -subtetrahedron subdivision ..... 1183
Annamaria Palamara Orsi, Product integration for Volterra integral equations of the second kind with weakly singular kernels ..... 1201
Ronald B. Morgan, On restarting the Arnoldi method for large non- symmetric eigenvalue problems ..... 1213
Carl de Boor, On the Sauer-Xu formula for the error in multivariate polynomial interpolation ..... 1231
V. Demichelis, Quasi-interpolatory splines based on Schoenberg points ..... 1235
Walter Gautschi and Shikang Li, On quadrature convergence of extended Lagrange interpolation ..... 1249



[^0]:    
    
    
    

