



AMERICAN MATHEMATICAL SOCIETY

EDITORS

Bulletin Articles

Donald G. Saari *Chief Editor*

Book Reviews

Robert L. Devaney

PROVIDENCE, RHODE ISLAND USA

ISSN 0273-0979

Bulletin (New Series) of the American Mathematical Society

This journal is devoted to articles of the following types:

Bulletin Articles

Two types of articles will be included in this section: (1) papers that present a clear and insightful exposition of significant aspects of contemporary mathematical research, including Gibbs Lectures, Progress in Mathematics Lectures, and Retiring Presidential Addresses; and (2) brief, timely reports on important mathematical developments, which are normally solicited and often written by a disinterested expert.

Book Reviews

Book Reviews are accepted for publication by invitation only. Unsolicited manuscripts will not be considered.

Submission information. See Information for Authors at the end of this issue. Publisher Item Identifier. The Publisher Item Identifier (PII) appears at the top of the first page of each article published in this journal. This alphanumeric string of characters uniquely identifies each article and can be used for future cataloging, searching, and electronic retrieval.

Postings to the AMS website. Articles are posted to the AMS website individually after proof is returned from authors and before appearing in an issue.

Subscription information. Bulletin (New Series) of the American Mathematical Society is published quarterly. The Bulletin is also accessible electronically, starting with the January 1992 issue, from www.ams.org/publications/. For paper delivery, subscription prices for Volume 40 (2003) are \$357 list, \$286 institutional member, \$214 individual member. The subscription price for members is included in the annual dues. A late charge of 10% of the subscription price will be imposed upon orders received from nonmembers after January 1 of the subscription year. Subscribers outside the United States and India must pay a postage surcharge of \$8; subscribers in India must pay a postage surcharge of \$15. Expedited delivery to destinations in North America is \$12; elsewhere \$28.

Back number information. For back issues see www.ams.org/bookstore/.

Subscriptions and orders should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment*. Other correspondence should be addressed to the American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

Copying and reprinting. Material in this journal may be reproduced by any means for educational and scientific purposes without fee or permission with the exception of reproduction by services that collect fees for delivery of documents and provided that the customary acknowledgment of the source is given. This consent does not extend to other kinds of copying for general distribution, for advertising or promotional purposes, or for resale. Requests for permission for commercial use of material should be addressed to the Acquisitions Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. Requests can also be made by e-mail to reprint-permission@ams.org.

Excluded from these provisions is material in articles for which the author holds copyright. In such cases, requests for permission to use or reprint should be addressed directly to the author(s). (Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.)

Bulletin (New Series) of the American Mathematical Society is published quarterly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2294 USA. Periodicals postage is paid at Providence, Rhode Island, and additional mailing offices. Postmaster: Send address changes to Bulletin, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

© 2003 American Mathematical Society. All rights reserved. This journal is indexed in Mathematical Reviews, Science Citation Index $^{\mathbb{R}}$, Science Citation Index $^{\mathbb{T}M}$ —Expanded, ISI Alerting Services $^{\mathbb{S}M}$, CompuMath Citation Index $^{\mathbb{R}}$, and Current Contents Physical, Chemical & Earth Sciences. Printed in the United States of America.

 \otimes The paper used in this journal is acid-free and falls within the guidelines established to ensure permanence and durability.

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY CONTENTS

Vol. 40, No. 4 October :	2003
BULLETIN ARTICLES	
Jean-Pierre Serre, On a theorem of Jordan Peter Sarnak, Spectra of hyperbolic surfaces Josef Hofbauer and Karl Sigmund, Evolutionary game dynamics	429 441 479
BOOK REVIEWS	
Peter E. Trapa (Reviewer), Lie groups: An introduction through linear groups, by Wulf Rossmann	521 529 535

The most recent articles of the AMS journal *Electronic Research* Announcements are listed at the back of this issue.

INDEX TO VOLUME 40 (2003)

RESEARCH-EXPOSITORY SURVEYS

Arthur, James. The principle of functoriality, 39 Berry, Michael. Making light of mathematics, 229

Brezis, Haim. The interplay between analysis and topology in some nonlinear PDE problems, 179

Diaconis, Persi. Patterns in eigenvalues: The 70th Josiah Willard Gibbs Lecture, 155

Franks, John. Rotation numbers and instability sets, 263

Freedman, Michael H., Kitaev, Alexei, Larsen, Michael J., and Wang, Zhenghan. *Topological quantum computation*, 31

Hauser, Herwig. The Hironaka theorem on resolution of singularities (Or: A proof we always wanted to understand), 323

Hofbauer, Josef, and Sigmund, Karl. Evolutionary game dynamics, 479

Kitaev, Alexei. See Freedman, Michael H.

Larsen, Michael J. See Freedman, Michael H.

Levin, Simon A. Complex adaptive systems: Exploring the known, the unknown and the unknowable, 3

Sarnak, Peter. Spectra of hyperbolic surfaces, 441

Serre, Jean-Pierre. On a theorem of Jordan, 429

Shelah, Saharon. Logical dreams, 203

Sigmund, Karl. See Hofbauer, Josef

Stanley, Richard P. Recent progress in algebraic combinatorics, 55

Taylor, Jean E. Some mathematical challenges in materials science, 69

Urbański, Mariusz. Measures and dimensions in conformal dynamics, 281

Varadhan, S. R. S. Stochastic analysis and applications, 89

Wang, Zhenghan. See Freedman, Michael H.

Witten, Edward. Physical law and the quest for mathematical understanding, 21

BOOK REVIEWS

Bass, Hyman, and Lubotzky, Alexander. Tree lattices, reviewed by Lucy Lifschitz, 247

Borel, Armand. Essays in the history of Lie groups and algebraic groups, reviewed by Brian Parshall, 253

Bourgain, J. Global solutions of nonlinear Schrödinger equations, reviewed by Gigliola Staffilani, 99

Chen, So-Chin, and Shaw, Mei-Chi. Partial differential equations in several complex variables, reviewed by Steven G. Krantz, 529

Grattan-Guinness, I. The search for mathematical roots, 1870-1940: Logics, set theories, and the foundations of mathematics from Cantor through Russell to Gödel, reviewed by William Ewald, 125

Greaves, George. Sieves in number theory, reviewed by Heini Halberstam, 109

Harris, Michael, and Taylor, Richard. The geometry and cohomology of some simple Shimura varieties, reviewed by Alan Roche, 239

Hélein, Frédéric. Constant mean curvature surfaces, harmonic maps and integrable systems, reviewed by Robert M. Hardt, 121

Jorgenson, Jay, and Lang, Serge. Spherical inversion on $\mathrm{Sl}(n,\mathbb{R})$, reviewed by Bernhard Krötz,

Lakshmikantham, V., and Trigiante, Donato. Theory of difference equations — numerical methods and applications, reviewed by Walter Kelley, 259

Lang, Serge. See Jorgenson, Jay

Lubotzky, Alexander. See Bass, Hyman

Mann, Avinoam, Regev, Amitai, Rowen, Louis, Saltman, David J., and Small, Lance W. (Editors).

Selected papers of S. A. Amitsur with commentary, reviewed by Edward Formanek, 131

Papastavridis, John G. Analytical mechanics: A comprehensive treatise on the dynamics of constrained systems; for engineers, physicists and mathematicians, reviewed by Jair Koiller, 405

INDEX TO VOLUME 40 (2003)

Parshall, Karen Hunger, and Rice, Adrian C. (Editors). Mathematics unbound: The evolution of an international mathematical research community, 1800-1945, reviewed by David E. Rowe, 535

Regev, Amitai. See Mann, Avinoam

Rice, Adrian C. See Parshall, Karen Hunger

Rossmann, Wulf. Lie groups: An introduction through linear groups, reviewed by Peter E. Trapa,

Rowen, Louis. See Mann, Avinoam

Saltman, David J. See Mann, Avinoam

Shaw, Mei-Chi. See Chen, So-Chin Small, Lance W. See Mann, Avinoam Taylor, Richard. See Harris, Michael

Timmesfeld, Franz Georg. Abstract root subgroups and simple groups of Lie-type, reviewed by Richard Weiss, 151

Trigiante, Donato. See Lakshmikantham, V.

Walnut, David F. An introduction to wavelet analysis, reviewed by Palle E. T. Jorgensen, 421

Wolfram, Stephen. A new kind of science, reviewed by Steven G. Krantz, 143



BULLETIN (N E W S E R I E S) OF THE

AMERICAN MATHEMATICAL SOCIETY

EDITORS

Donald G. Saari, *Chief Editor* Robert L. Devaney, *Book Reviews*

ASSOCIATE EDITORS

John C. Baez Martin Bridson Lawrence C. Evans Eric M. Friedlander Craig L. Huneke Krystyna M. Kuperberg Barry Mazur Haynes R. Miller Paul H. Rabinowitz Panagiotis E. Souganidis Michael Wolf

PROVIDENCE, RHODE ISLAND USA

ISSN 0273-0979

Bulletin (New Series) of the American Mathematical Society

This journal is devoted to articles of the following types:

Bulletin Articles

Two types of articles will be included in this section: (1) papers that present a clear and insightful exposition of significant aspects of contemporary mathematical research, including Gibbs Lectures, Progress in Mathematics Lectures, and Retiring Presidential Addresses; and (2) brief, timely reports on important mathematical developments, which are normally solicited and often written by a disinterested expert.

Book Reviews

Book Reviews are accepted for publication by invitation only. Unsolicited manuscripts will not be considered.

Submission information. See Information for Authors at the end of this issue. Publisher Item Identifier. The Publisher Item Identifier (PII) appears at the top of the first page of each article published in this journal. This alphanumeric string of characters uniquely identifies each article and can be used for future cataloging, searching, and electronic retrieval.

Postings to the AMS website. Articles are posted to the AMS website individually after proof is returned from authors and before appearing in an issue.

Subscription information. Bulletin (New Series) of the American Mathematical Society is published quarterly. The Bulletin is also accessible electronically, starting with the January 1992 issue, from www.ams.org/publications/. For paper delivery, subscription prices for Volume 40 (2003) are \$357 list, \$286 institutional member, \$214 individual member. The subscription price for members is included in the annual dues. A late charge of 10% of the subscription price will be imposed upon orders received from nonmembers after January 1 of the subscription year. Subscribers outside the United States and India must pay a postage surcharge of \$8; subscribers in India must pay a postage surcharge of \$15. Expedited delivery to destinations in North America is \$12; elsewhere \$28.

Back number information. For back issues see www.ams.org/bookstore/.

Subscriptions and orders should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment*. Other correspondence should be addressed to the American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

Copying and reprinting. Material in this journal may be reproduced by any means for educational and scientific purposes without fee or permission with the exception of reproduction by services that collect fees for delivery of documents and provided that the customary acknowledgment of the source is given. This consent does not extend to other kinds of copying for general distribution, for advertising or promotional purposes, or for resale. Requests for permission for commercial use of material should be addressed to the Acquisitions Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. Requests can also be made by e-mail to reprint-permission@ams.org.

Excluded from these provisions is material in articles for which the author holds copyright. In such cases, requests for permission to use or reprint should be addressed directly to the author(s). (Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.)

Bulletin (New Series) of the American Mathematical Society is published quarterly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2294 USA. Periodicals postage is paid at Providence, Rhode Island, and additional mailing offices. Postmaster: Send address changes to Bulletin, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

© 2003 American Mathematical Society. All rights reserved. This journal is indexed in Mathematical Reviews, Science Citation Index $^{\mathbb{R}}$, Science Citation Index $^{\mathbb{T}M}$ —Expanded, ISI Alerting Services $^{\mathbb{S}M}$, CompuMath Citation Index $^{\mathbb{R}}$, and Current Contents Physical, Chemical & Earth Sciences. Printed in the United States of America.

 \otimes The paper used in this journal is acid-free and falls within the guidelines established to ensure permanence and durability.

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY CONTENTS

Vol. 40, No. 1 January 2	2003
Bulletin Articles	
Donald G. Saari, Editor's Comment	1
Simon A. Levin, Complex adaptive systems: Exploring the known, the unknown and the unknowable	3
ing	21
Zhenghan Wang, Topological quantum computation James Arthur, The principle of functoriality Richard P. Stanley, Recent progress in algebraic combinatorics Jean E. Taylor, Some mathematical challenges in materials science S. R. S. Varadhan, Stochastic analysis and applications	31 39 55 69 89
Book Reviews	
Gigliola Staffilani (Reviewer), Global solutions of nonlinear Schrödinger equations, by J. Bourgain	99
Heini Halberstam (Reviewer), Sieves in number theory, by George Greaves Robert M. Hardt (Reviewer), Constant mean curvature surfaces, harmonic	109
maps and integrable systems, by Frédéric Hélein	121
Logics, set theories, and the foundations of mathematics from Cantor through Russell to Gödel, by I. Grattan-Guinness	125
Edward Formanek (Reviewer), Selected papers of S. A. Amitsur with commentary, edited by Avinoam Mann, Amitai Regev, Louis Rowen, David J. Saltman, and Lance W. Small (eds.)	131
Bernhard Krötz (Reviewer), Spherical inversion on $Sl(n,\mathbb{R})$, by Jay Jorgenson and Serge Lang	137
Steven G. Krantz (Reviewer), A new kind of science, by Stephen Wolfram Richard Weiss (Reviewer), Abstract root subgroups and simple groups of	143
Lie-type, by Franz Georg Timmesfeld	151
N/ 1 40 N/ 0	2008
Vol. 40, No. 2 April 2	2003
Bulletin Articles	
Persi Diaconis, Patterns in eigenvalues: The 70th Josiah Willard Gibbs Lecture	155
Haim Brezis, The interplay between analysis and topology in some nonlinear PDE problems	179
Saharon Shelah, Logical dreams Michael Berry, Making light of mathematics	203 229

Book Reviews

Alan Roche (Reviewer), The geometry and cohomology of some simple Shimura varieties, by Michael Harris and Richard Taylor	239
Lucy Lifschitz (Reviewer), Tree lattices, by Hyman Bass and Alexander Lubotzky	247
Brian Parshall (Reviewer), Essays in the history of Lie groups and algebraic	241
groups, by Armand Borel	253
Walter Kelley (Reviewer), Theory of difference equations — numerical methods and applications, by V. Lakshmikantham and Donato Trigiante	259
Vol. 40, No. 3 July 2	2003
Bulletin Articles	
John Franks, Rotation numbers and instability sets	263
Mariusz Urbański, Measures and dimensions in conformal dynamics	281 323
Book Reviews	
Jair Koiller (Reviewer), Analytical mechanics: A comprehensive treatise on the dynamics of constrained systems; for engineers, physicists and mathematicians, by John C. Papastayridis	405
mathematicians, by John G. Papastavridis	421
David I . wallut	421
Vol. 40, No. 4 October 2	2003
Bulletin Articles	
Jean-Pierre Serre, On a theorem of Jordan	
Peter Sarnak, Spectra of hyperbolic surfaces	441 479
	110
Book Reviews	
Peter E. Trapa (Reviewer), Lie groups: An introduction through linear groups, by Wulf Rossmann	521
 Steven G. Krantz (Reviewer), Partial differential equations in several complex variables, by So-Chin Chen and Mei-Chi Shaw David E. Rowe (Reviewer), Mathematics unbound: The evolution of an international mathematical research community, 1800–1945, by Karen 	529
Hunger Parshall and Adrian C. Rice (eds.)	535

Editorial Board for Bulletin Articles

John C. Baez Martin R. Bridson Eric M. Friedlander Craig L. Huneke Krystyna M. Kuperberg Barry Mazur Haynes R. Miller Paul H. Rabinowitz Donald G. Saari, Chair Panagiotis E. Souganidis Michael Wolf

Editorial Board for Book Reviews

Robert L. Devaney, Chair

Lawrence C. Evans

Chief Editor: Donald G. Saari

Editorial Information

As of June 30, 2003, the backlog for this journal was approximately 0 issues. This estimate is the result of reducing 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 number of articles assigned to issues to be published in four months (the time necessary for editing and composing a typical issue). In an effort to make articles available as quickly as possible, articles are posted to the AMS website individually after proof is returned from authors and before appearing in an issue.

A Consent to Publish and Copyright Agreement is required before a paper will be published in this journal. After a paper is accepted for publication, the Providence office will send a Consent to Publish and Copyright Agreement to all authors of the paper. 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. Bulletin articles may be of two types: (1) reasonably broad expository surveys of a currently active area of mathematical research and (2) reports on a recent accomplishment in mathematical research. Three copies of the manuscript should be submitted to Professor Donald G. Saari, Department of Mathematics, Multipurpose Science and Technology Building, University of California, Irvine, CA 92697-3875 USA. Manuscripts may also be submitted to other members of the Editorial Board, with a copy of the cover letter and of the manuscript also sent to Professor Donald G. Saari. The author should keep one copy. Bulletin articles may also be submitted electronically in \mathcal{AMS} -IATEX or \mathcal{AMS} -TEX to bams@math.uci.edu.

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* should be a brief technical description of the new material.

Both types of *Bulletin* articles should be written so as to be understandable by graduate students or mathematicians who are not experts in the subject matter of the article. A well-written expository article will include motivating problems and examples, some indication of the historical development of the subject, and of course the results and open problems that make it an interesting and exciting area of mathematics. In most cases proofs should be at most briefly sketched, and there should be a good bibliography whose main aim is to help those wishing to pursue the subject further. Articles reporting on recent mathematical research should include an introductory section addressed to nonexperts describing the motivation, background, and significance of the results announced.

Following the statement of results, there should be a sketch of proofs that may be addressed to experts, including elements of the proof which are novel. References should be given so that an interested reader can find the details.

Included with the footnotes in each paper should be the 2000 Mathematics Subject Classification representing the primary and secondary subjects of the article. The classifications are accessible from www.ams.org/msc/. The list of classifications is also available in print starting with the 1999 annual index of Mathematical Reviews. The Mathematics Subject Classification footnote may be followed by a list of key words and phrases describing the subject matter of the article and taken from it. Journal abbreviations used in bibliographies are listed in the latest Mathematical Reviews annual index. The series abbreviations are also accessible from www.ams.org/publications/. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at www.ams.org/mrlookup/. 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.

Bulletin Articles are normally solicited by the Editorial Board, but unsolicited manuscripts will also be considered. In particular, those giving lectures (Gibbs Lectures, Colloquium Lectures, and Progress in Mathematics Lectures) or invited hour addresses at meetings of the Society are encouraged to write up their lectures in a manner that meets the requirements for expository articles described above and to submit their manuscripts for consideration by the Editorial Board for Bulletin Articles.

For Book Reviews the first page must include the title of the book being reviewed; the name(s) of the author(s); publisher; city of publication; year of publication; number of pages, including front matter; price if known; and ISBN. There should also be a footnote with the 2000 *Mathematics Subject Classification* representing the primary and secondary subjects of the book under review. The classifications are accessible from www.ams.org/msc/ and are also available in print starting with the 1999 annual index of *Mathematical Reviews*. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at www.ams.org/mrlookup/.

Electronically prepared manuscripts. The AMS encourages electronically prepared manuscripts, with a strong preference for $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX. To this end, the Society has prepared $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX author $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX style file that generates the particular design specifications of that publication series. Articles properly prepared using the $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX style file and the \label and \ref commands automatically enable extensive intra-document linking to the bibliography and other elements of the article for searching electronically on the Web. Because linking must often be added manually to electronically prepared manuscripts in other forms of TeX, using $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX 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. $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -IATEX papers also move more efficiently through the production stream, helping to minimize publishing costs.

 $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -ETEX is the highly preferred format of TEX, but author packages are also available in $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -TEX. Those authors who make use of these style files from the beginning of the writing process will further reduce their own efforts. Manuscripts prepared electronically in ETEX or plain TEX 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. LATEX users will find that $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -LATEX is the same as LATEX with additional commands to simplify the typesetting of mathematics, and users of plain TEX should have the foundation for learning $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -LATEX.

Authors may retrieve an author package from the AMS website starting from www.ams.org/tex/ or via FTP to ftp.ams.org (login as anonymous, enter username as password, and type cd pub/author-info). The AMS Author Handbook and the Instruction Manual are available in PDF format following the author packages link from www.ams.org/tex/. The author package can also be obtained free of charge by sending email to pub@ams.org

(Internet) or from the Publication Division, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. When requesting an author package, please specify $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -ITEX or $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ -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.

At the time of submission, authors should indicate if the paper has been prepared using $\mathcal{A}_{\mathcal{M}}$ S-IATEX or $\mathcal{A}_{\mathcal{M}}$ S-TEX and provide the Editor with a paper manuscript that matches the electronic manuscript. 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 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 email to pub-submit@ams.org (Internet) or on diskette to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. When sending a manuscript electronically, 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 send files are included in the author package.

Electronic graphics. Comprehensive instructions on preparing graphics are available from www.ams.org/jourhtml/authors.html. A few of the major requirements are given here.

Submit files for graphics as EPS (Encapsulated PostScript) files. This includes graphics originated via a graphic application as well as scanned photographs or other computer-generated images. If this is not possible, TIFF files are acceptable as long as they can be opened in Adobe Photoshop or Illustrator. 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 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. Variations of screens within a graphic should be no less than 10%.

Peer-review submission. Bulletin authors may submit manuscripts for peer review as either PDF (strongly recommended) or PostScript files at http://www.ams.org/peer-review/submission.pl. Manuscripts must be a single file with images embedded. PostScript files will automatically be converted to PDF, and authors will have a chance to view the manuscript and data entered before releasing the manuscript into the system. Two-digit 2000 Mathematics Subject Classification numbers are included in a pull-down menu; classifications are accessible from http://www.ams.org/msc/. Complete author instructions are available at the site.

Authors who cannot supply PDF or PS files may submit paper copy of their manuscript to *Bulletin/Peer-Review Submissions*, 201 Charles Street, Providence, RI 02904-2294 USA. These submissions will be scanned into a PDF file and entered by AMS staff into the peer-review system. Please provide all the data required in the submission form to avoid delays in posting the manuscript.

Upon submission the manuscript will either move immediately into the AMS posting stream or go through conversion to PDF. The manuscript will then be placed in a secure area for the *Bulletin* Chief Editor, who will be notified weekly of new submissions. The Editor will collect these submissions and assign them to subject area specialists for peer review. Queries concerning the status of submissions should be sent to the Editor at bams@math.uci.edu.

AMS policy on making changes to articles after posting. Articles are posted to the AMS website individually after proof is returned from authors and before appearing in an issue. To preserve the integrity of electronically published articles, once an article is individually posted to the AMS website but not yet in an issue, changes cannot be made in place in the paper. However, an "Added after posting" section may be added to the paper right before the References when there is a critical error in the content of the paper. The "Added after posting" section gives the author an opportunity to correct this type of critical error before the article is put into an issue for printing and before it is then reposted with the issue. The "Added after posting" section remains a permanent part of the paper. The AMS does not keep author-related information, such as affiliation, current address, and email address, up to date after a paper is initially posted.

Once the article is assigned to an issue, even if the issue has not yet been posted to the AMS website, corrections may be made to the paper by submitting a traditional errata article to the Editor. The errata article will appear in a future print issue and will link back and forth on the Web to the original article online.

Secure manuscript tracking on the Web and via email. Authors can track their manuscripts through the AMS journal production process using the personal AMS ID and Article ID printed in the upper right-hand corner of the Consent to Publish form sent to each author who publishes in AMS journals. Access to the tracking system is available from www.ams.org/mstrack/ or via email sent to mstrack-query@ams.org. To access by email, on the subject line of the message simply enter the AMS ID and Article ID. To track more than one manuscript by email, choose one of the Article IDs and enter the AMS ID and the Article ID followed by the word all on the subject line. An explanation of each production step is provided on the Web through links from the manuscript tracking screen. Questions can be sent to bull-query@ams.org.

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, T_FX files can be downloaded from the AMS website, starting from 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, TFX files are available upon request for authors without Web access by sending email to file-request@ams.org or by contacting the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. 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 email, please include the email 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 T_FX production at the AMS sometimes requires extra fonts and macros that are not yet publicly available, TEX files cannot be guaranteed to run through the author's version of T_EX without errors. The AMS regrets that it cannot provide support to eliminate such errors in the author's T_FX environment.

Inquiries. Any inquiries concerning a paper that has been accepted for publication that cannot be answered via the manuscript tracking system mentioned above should be sent to bull-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

AMERICAN MATHEMATICAL SOCIETY

Electronic Research Announcements

AMERICAN MATHEMATICAL SOCIETY

MANAGING EDITOR Svetlana Katok

EDITORIAL BOARD

Stuart Antman David Benson Dmitri Burago Tobias H. Colding Mark Freidlin Ronald Graham Yitzhak Katznelson David Kazhdan Alexander Kechris Alexandre Kirillov Frances Kirwan Krystyna Kuperberg Robert Lazarsfeld **Gregory Margulis Hugh Montgomery** Walter Neumann Klaus Schmidt Masamichi Takesaki Michael Taylor **Guido Weiss** Zhihong (Jeff) Xia Don Zagier Efim Zelmanov

Most recent articles

Zhi-Wei Sun, Unification of zero-sum problems, subset sums and covers of $\ensuremath{\mathbb{Z}}$

A. Yu. Ol'shanski and M. V. Sapir, The conjugacy problem for groups, and Higman embeddings

Abderrazek Karoui, A note on the construction of nonseparable wavelet bases and multiwavelet matrix filters of $L^2(\mathbb{R}^n)$, where $n \ge 2$

José F. Alves, Stefano Luzzatto, and Vilton Pinheiro, Markov structures for non-uniformly expanding maps on compact manifolds in arbitrary dimension

Olivier Druet, Emmanuel Hebey, and Frédéric Robert, A C^0 -theory for the blow-up of second order elliptic equations of critical Sobolev growth

Andrea Bonfiglioli, Ermanno Lanconelli, and Francesco Uguzzoni, Levi's parametrix for some sub-elliptic non-divergence form operators

Daniel T. Wise, Nonpositive immersions, sectional curvature, and subgroup properties

The American Mathematical Society's electronic-only journal, *Electronic Research Announcements of the AMS* (ERA-AMS), is available on the World Wide Web at www.ams.org/era.

ERA-AMS publishes high-quality research announcements of significant advances in all branches of mathematics. Authors may submit manuscripts to any editor. All papers are reviewed, and the entire Editorial Board must approve the acceptance of any paper. Papers are posted as soon as they are accepted and processed by the AMS.



BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY CONTENTS

Vol. 40, No. 4 October 2	2003
BULLETIN ARTICLES	
Jean-Pierre Serre, On a theorem of Jordan	429 441 479
BOOK REVIEWS	
Peter E. Trapa (Reviewer), Lie groups: An introduction through linear groups by Wulf Rossmann	521
Steven G. Krantz (Reviewer), Partial differential equations in several complex variables by So-Chin Chen and Mei-Chi Shaw	529
David E. Rowe (Reviewer), Mathematics unbound: The evolution of an international mathematical research community, 1800–1945 by Karen	
Hunger Parshall and Adrian C. Rice (eds.)	-535

The most recent articles of the AMS journal $Electronic\ Research\ Announcements$ are listed at the back of this issue.



0273-0979(200310)40:4*;1-A