
VOLUME 15 NUMBER 4



OCTOBER 2002

JOURNAL

OF THE

AMERICAN MATHEMATICAL SOCIETY

EDITORS

Bernd Sturmfels
Ingrid Daubechies
Robert Lazarsfeld
Andrei Okounkov
Richard M. Schoen

ASSOCIATE EDITORS

James G. Arthur
Alexander Beilinson
F. Michael Christ
Constantine M. Dafermos
Weinan E
Lawrence C. Evans
Michael J. Hopkins
Ehud Hrushovski
Grigori A. Margulis
Curtis T. McMullen
Tomasz S. Mrowka
Bjorn Poonen
Jonathan M. Rosenberg
Karen E. Smith
Richard Stanley
S. R. S. Varadhan
W. Hugh Woodin
Efim Zelmanov
Shou-Wu Zhang

PROVIDENCE, RHODE ISLAND USA

ISSN 0894-0347

Available electronically at
www.ams.org/jams/

Journal of the American Mathematical Society

This journal is devoted to research articles of the highest quality in all areas of pure and applied mathematics.

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. The *Journal of the American Mathematical Society* is published quarterly. Beginning January 1996 the *Journal of the American Mathematical Society* is accessible from www.ams.org/publications/. Subscription prices for Volume 15 (2002) are as follows: for paper delivery, \$232 list, \$186 institutional member, \$209 corporate member, \$139 individual member; for electronic delivery, \$209 list, \$167 institutional member, \$188 corporate member, \$125 individual member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. If ordering the paper version, add \$10 for surface delivery outside the United States and India; \$18 to India. Expedited delivery to destinations in North America is \$16; elsewhere \$40. For paper delivery a late charge of 10% of the subscription price will be imposed upon orders received from nonmembers after January 1 of the subscription year.

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 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.)

The *Journal of the American Mathematical Society* is published quarterly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2294 USA and is mailed from Providence, Rhode Island. Periodicals postage is paid at Providence, Rhode Island. Postmaster: Send address changes to Journal of the AMS, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

© 2002 by the American Mathematical Society. All rights reserved.

This journal is indexed in *Mathematical Reviews*, *Zentralblatt MATH*, *Science Citation Index*[®], *Science Citation Index*[™]-*Expanded*, *ISI Alerting Services*SM, *CompuMath Citation Index*[®], and *Current Contents*[®]/*Physical, Chemical & Earth Sciences*.

Printed in the United States of America.

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

10 9 8 7 6 5 4 3 2 1 07 06 05 04 03 02

INDEX TO VOLUME 15 (2002)

- Abramovich, Dan, Karu, Kalle, Matsuki, Kenji, and Włodarczyk, Jarosław. *Torification and factorization of birational maps*, 531
- Abramovich, Dan, and Vistoli, Angelo. *Compactifying the space of stable maps*, 27
- Bousch, Thierry, and Mairesse, Jean. *Asymptotic height optimization for topological IFS, Tetris heaps, and the finiteness conjecture*, 77
- Caffarelli, Luis A., Feldman, Mikhail, and McCann, Robert J. *Constructing optimal maps for Monge's transport problem as a limit of strictly convex costs*, 1
- Ciocan-Fontanine, Ionuț, and Kapranov, Mikhail M. *Derived Hilbert schemes*, 787
- Cordoba, Diego, and Fefferman, Charles. *Growth of solutions for QG and 2D Euler equations*, 665
- Dembo, Amir, Poonen, Bjorn, Shao, Qi-Man, and Zeitouni, Ofer. *Random polynomials having few or no real zeros*, 857
- Emerton, Matthew. *Supersingular elliptic curves, theta series and weight two modular forms*, 671
- Fefferman, Charles. *See Cordoba, Diego*
- Feldman, Mikhail. *See Caffarelli, Luis A.*
- Fomin, Sergey, and Zelevinsky, Andrei. *Cluster algebras I: Foundations*, 497
- Frenkel, E., Gaitsgory, D., and Vilonen, K. *On the geometric Langlands conjecture*, 367
- Gaitsgory, D. *See Frenkel, E.*
- Gibney, Angela, Keel, Sean, and Morrison, Ian. *Towards the ample cone of $\overline{M}_{g,n}$* , 273
- Gorelik, Maria. *Annihilation Theorem and Separation Theorem for basic classical Lie superalgebras*, 113
- . *Strongly typical representations of the basic classical Lie superalgebras*, 167
- Huang, Jing-Song, and Pandžić, Pavle. *Dirac cohomology, unitary representations and a proof of a conjecture of Vogan*, 185
- Jackson, Steve, and Mauldin, R. Daniel. *On a lattice problem of H. Steinhaus*, 817
- Kapranov, Mikhail M. *See Ciocan-Fontanine, Ionuț*
- Karu, Kalle. *See Abramovich, Dan*
- Keel, Sean. *See Gibney, Angela*
- Khovanov, Mikhail, and Seidel, Paul. *Quivers, Floer cohomology, and braid group actions*, 203
- Lyubarskii, Yurii I., and Seip, Kristian. *Weighted Paley-Wiener spaces*, 979
- Mairesse, Jean. *See Bousch, Thierry*
- Martel, Yvan, and Merle, Frank. *Blow up in finite time and dynamics of blow up solutions for the L^2 -critical generalized KdV equation*, 617
- Matsuki, Kenji. *See Abramovich, Dan*
- Mauldin, R. Daniel. *See Jackson, Steve*
- McCann, Robert J. *See Caffarelli, Luis A.*
- Merle, Frank. *See Martel, Yvan*
- Möeglin, Colette, and Tadić, Marko. *Construction of discrete series for classical p -adic groups*, 715
- Morrison, Ian. *See Gibney, Angela*
- Muscalu, Camil, Tao, Terence, and Thiele, Christoph. *Multi-linear operators given by singular multipliers*, 469
- Mustața, Mircea. *Singularities of pairs via jet schemes*, 599
- Pandžić, Pavle. *See Huang, Jing-Song*
- Poonen, Bjorn. *See Dembo, Amir*
- Rapinchuk, Andrei S., Segev, Yoav, and Seitz, Gary M. *Finite quotients of the multiplicative group of a finite dimensional division algebra are solvable*, 929
- Reiten, I., and Van den Bergh, M. *Noetherian hereditary abelian categories satisfying Serre duality*, 295
- Scannell, Kevin P., and Wolf, Michael. *The grafting map of Teichmüller space*, 893
- Schneider, Peter, and Teitelbaum, Jeremy. *Locally analytic distributions and p -adic representation theory, with applications to GL_2* , 443
- Segev, Yoav. *See Rapinchuk, Andrei S.*
- Seidel, Paul. *See Khovanov, Mikhail*
- Seip, Kristian. *See Lyubarskii, Yurii I.*
- Seitz, Gary M. *See Rapinchuk, Andrei S.*
- Shao, Qi-Man. *See Dembo, Amir*

INDEX TO VOLUME 15 (2002)

- Tadić, Marko. *See* Mœglin, Colette
Tao, Terence. *See* Muscalu, Camil
Tataru, Daniel. *Strichartz estimates for second order hyperbolic operators with nonsmooth coefficients III*, 419
Teitelbaum, Jeremy. *See* Schneider, Peter
Thiele, Christoph. *See* Muscalu, Camil
Van den Bergh, M. *See* Reiten, I.
Vilonen, K. *See* Frenkel, E.
Vistoli, Angelo. *See* Abramovich, Dan
Włodarczyk, Jarosław. *See* Abramovich, Dan
Wolf, Michael. *See* Scannell, Kevin P.
Xu, Jinchao, and Zikatanov, Ludmil. *The method of alternating projections and the method of subspace corrections in Hilbert space*, 573
Zeitouni, Ofer. *See* Dembo, Amir
Zelevinsky, Andrei. *See* Fomin, Sergey
Zikatanov, Ludmil. *See* Xu, Jinchao



JOURNAL

OF THE

A M E R I C A N M A T H E M A T I C A L S O C I E T Y

EDITORS

Bernd Sturmfels
Ingrid Daubechies
Robert Lazarsfeld
Andrei Okounkov
Richard M. Schoen

ASSOCIATE EDITORS

James G. Arthur
Alexander Beilinson
F. Michael Christ
Constantine M. Dafermos
Weinan E
Lawrence C. Evans
Michael J. Hopkins
Ehud Hrushovski
Grigorii A. Margulis
Curtis T. McMullen
Tomasz S. Mrowka
Bjorn Poonen
Jonathan M. Rosenberg
Karen E. Smith
Richard Stanley
S. R. S. Varadhan
W. Hugh Woodin
Efim Zelmanov
Shou-Wu Zhang

PROVIDENCE, RHODE ISLAND USA

ISSN 0894-0347

Journal of the American Mathematical Society

This journal is devoted to research articles of the highest quality in all areas of pure and applied mathematics.

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. The *Journal of the American Mathematical Society* is published quarterly. Beginning January 1996 the *Journal of the American Mathematical Society* is accessible from www.ams.org/publications/. Subscription prices for Volume 15 (2002) are as follows: for paper delivery, \$232 list, \$186 institutional member, \$209 corporate member, \$139 individual member; for electronic delivery, \$209 list, \$167 institutional member, \$188 corporate member, \$125 individual member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. If ordering the paper version, add \$10 for surface delivery outside the United States and India; \$18 to India. Expedited delivery to destinations in North America is \$16; elsewhere \$40. For paper delivery a late charge of 10% of the subscription price will be imposed upon orders received from nonmembers after January 1 of the subscription year.

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 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.)

The *Journal of the American Mathematical Society* is published quarterly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2294 USA and is mailed from Providence, Rhode Island. Periodicals postage is paid at Providence, Rhode Island. Postmaster: Send address changes to Journal of the AMS, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

© 2002 by the American Mathematical Society. All rights reserved.

This journal is indexed in *Mathematical Reviews*, *Zentralblatt MATH*, *Science Citation Index*[®], *Science Citation Index*[™]-*Expanded*, *ISI Alerting Services*SM, *CompuMath Citation Index*[®], and *Current Contents*[®]/*Physical, Chemical & Earth Sciences*.

Printed in the United States of America.

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

10 9 8 7 6 5 4 3 2 1 07 06 05 04 03 02

JOURNAL OF THE AMERICAN MATHEMATICAL SOCIETY
CONTENTS

Vol. 15, No. 1

January 2002

Luis A. Caffarelli, Mikhail Feldman, and Robert J. McCann, Constructing optimal maps for Monge's transport problem as a limit of strictly convex costs	1
Dan Abramovich and Angelo Vistoli, Compactifying the space of stable maps	27
Thierry Bouch and Jean Mairesse, Asymptotic height optimization for topological IFS, Tetris heaps, and the finiteness conjecture	77
Maria Gorelik, Annihilation Theorem and Separation Theorem for basic classical Lie superalgebras	113
Maria Gorelik, Strongly typical representations of the basic classical Lie superalgebras	167
Jing-Song Huang and Pavle Pandžić, Dirac cohomology, unitary representations and a proof of a conjecture of Vogan	185
Mikhail Khovanov and Paul Seidel, Quivers, Floer cohomology, and braid group actions	203

Vol. 15, No. 2

April 2002

Angela Gibney, Sean Keel, and Ian Morrison, Towards the ample cone of $\overline{M}_{g,n}$	273
I. Reiten and M. Van den Bergh, Noetherian hereditary abelian categories satisfying Serre duality	295
E. Frenkel, D. Gaitsgory, and K. Vilonen, On the geometric Langlands conjecture	367
Daniel Tataru, Strichartz estimates for second order hyperbolic operators with nonsmooth coefficients III	419
Peter Schneider and Jeremy Teitelbaum, Locally analytic distributions and p -adic representation theory, with applications to GL_2	443
Camil Muscalu, Terence Tao, and Christoph Thiele, Multi-linear operators given by singular multipliers	469
Sergey Fomin and Andrei Zelevinsky, Cluster algebras I: Foundations	497

Vol. 15, No. 3

July 2002

Dan Abramovich, Kalle Karu, Kenji Matsuki, and Jarosław Włodarczyk, Torification and factorization of birational maps	531
Jinchao Xu and Ludmil Zikatanov, The method of alternating projections and the method of subspace corrections in Hilbert space	573

Mircea Mustața, Singularities of pairs via jet schemes	599
Yvan Martel and Frank Merle, Blow up in finite time and dynamics of blow up solutions for the L^2 -critical generalized KdV equation	617
Diego Cordoba and Charles Fefferman, Growth of solutions for QG and 2D Euler equations	665
Matthew Emerton, Supersingular elliptic curves, theta series and weight two modular forms	671
Colette Mœglin and Marko Tadić, Construction of discrete series for classical p -adic groups	715

Vol. 15, No. 4

October 2002

Ionuț Ciocan-Fontanine and Mikhail M. Kapranov, Derived Hilbert schemes	787
Steve Jackson and R. Daniel Mauldin, On a lattice problem of H. Steinhaus	817
Amir Dembo, Bjorn Poonen, Qi-Man Shao, and Ofer Zeitouni, Random polynomials having few or no real zeros	857
Kevin P. Scannell and Michael Wolf, The grafting map of Teichmüller space	893
Andrei S. Rapinchuk, Yoav Segev, and Gary M. Seitz, Finite quotients of the multiplicative group of a finite dimensional division algebra are solvable	929
Yurii I. Lyubarskii and Kristian Seip, Weighted Paley-Wiener spaces ..	979

Editors

Bernd Sturmfels
Department of Mathematics
University of California at Berkeley
Berkeley, CA 94720-0001 USA
bernd@math.berkeley.edu

Ingrid Daubechies
Department of Mathematics & PACM
218 Fine Hall
Princeton University
Princeton, NJ 08544-1000 USA
ingrid@math.princeton.edu

Andrei Okounkov
Department of Mathematics
University of California at Berkeley
Berkeley, CA 94720-3840 USA
okounkov@math.berkeley.edu

Robert Lazarsfeld
Department of Mathematics
University of Michigan
Ann Arbor, MI 48109-1109 USA
rlaz@math.lsa.umich.edu

Richard M. Schoen
Department of Mathematics
Stanford University
Stanford, CA 94305-2060 USA
schoen@math.stanford.edu

Associate Editors

James G. Arthur, University of Toronto
Alexander Beilinson, University of Chicago
F. Michael Christ, University of California, Berkeley
Constantine M. Dafermos, Brown University
Weinan E, Princeton University
Lawrence C. Evans, University of California, Berkeley
Michael J. Hopkins, Massachusetts Institute of Technology
Ehud Hrushovski, Hebrew University of Jerusalem
Grigori A. Margulis, Yale University
Curtis T. McMullen, Harvard University
Tomasz S. Mrowka, Massachusetts Institute of Technology
Bjorn Poonen, University of California, Berkeley
Jonathan M. Rosenberg, University of Maryland
Karen E. Smith, University of Michigan
Richard Stanley, Massachusetts Institute of Technology
S. R. S. Varadhan, New York University–Courant Institute
W. Hugh Woodin, University of California, Berkeley
Efim Zelmanov, Yale University
Shou-Wu Zhang, Columbia University

Assistant to the Editorial Board

Judy Garza
Department of Mathematics
University of Chicago
Chicago, IL 60637-1514 USA
jgarza@math.uchicago.edu

Editorial Information

As of May 31, 2002, the backlog for this journal was approximately 0 issues. 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 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 manuscript has not been submitted to nor is it under consideration for publication by another journal, conference proceedings, or similar publication.

Information for Authors

Initial submission. Two copies of the paper should be sent directly to one of the Editors (not an Associate Editor), and the author should keep one copy.

IF an editor is agreeable, an electronic manuscript prepared in $\text{T}_{\text{E}}\text{X}$ or $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ may be submitted by pointing to an appropriate URL on a preprint or e-print server.

The first page must contain a *descriptive title* that is short, but informative; useless or vague phrases such as “some remarks about” or “concerning” should be avoided. Although an abstract is not required upon initial submission, upon acceptance authors will be requested to supply an abstract for the electronic version of this journal. The AMS offers free worldwide access to the electronic abstracts. An abstract should be at least one complete sentence and at most 300 words. No abstracts will appear in the printed journal starting in 1998. Included with the footnotes to the 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.

Electronically prepared manuscripts. The AMS encourages electronically prepared manuscripts, with a strong preference for $\mathcal{A}\mathcal{M}\mathcal{S}\text{-L}^{\text{A}}\text{T}_{\text{E}}\text{X}$. To this end, the Society has prepared $\mathcal{A}\mathcal{M}\mathcal{S}\text{-L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ 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 $\mathcal{A}\mathcal{M}\mathcal{S}\text{-L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ 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 $\text{T}_{\text{E}}\text{X}$, using $\mathcal{A}\mathcal{M}\mathcal{S}\text{-L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ 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. $\mathcal{A}\mathcal{M}\mathcal{S}\text{-L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ papers also move more efficiently through the production stream, helping to minimize publishing costs.

$\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ is the highly preferred format of $\mathcal{T}\mathcal{E}\mathcal{X}$, but author packages are also available in $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{T}\mathcal{E}\mathcal{X}$. 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 $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ or plain $\mathcal{T}\mathcal{E}\mathcal{X}$ 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. $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ users will find that $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ is the same as $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ with additional commands to simplify the typesetting of mathematics, and users of plain $\mathcal{T}\mathcal{E}\mathcal{X}$ should have the foundation for learning $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$.

Authors may retrieve an author package from the AMS website starting from www.ams.org/tex/ or via FTP to [ftp.ams.org](ftp://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 $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ or $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{T}\mathcal{E}\mathcal{X}$, Macintosh or IBM (3.5) format, and the publication in which your paper will appear. Please be sure to include your complete mailing address.

At the time of submission, authors should indicate if the paper has been prepared using $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ or $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{T}\mathcal{E}\mathcal{X}$ 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 graphics 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 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. Variations of screens within a graphic should be no less than 10%.

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 jams-query@ams.org.

T_EX 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_EX 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, T_EX 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 T_EX 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_EX production at the AMS sometimes requires extra fonts and macros that are not yet publicly available, T_EX 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 \TeX 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 jams-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

JOURNAL OF THE AMERICAN MATHEMATICAL SOCIETY
CONTENTS

Vol. 15, No. 4

October 2002

Ionuț Ciocan-Fontanine and Mikhail M. Kapranov , Derived Hilbert schemes	787
Steve Jackson and R. Daniel Mauldin , On a lattice problem of H. Steinhaus	817
Amir Dembo, Bjorn Poonen, Qi-Man Shao, and Ofer Zeitouni , Random polynomials having few or no real zeros	857
Kevin P. Scannell and Michael Wolf , The grafting map of Teichmüller space	893
Andrei S. Rapinchuk, Yoav Segev, and Gary M. Seitz , Finite quotients of the multiplicative group of a finite dimensional division algebra are solvable	929
Yurii I. Lyubarskii and Kristian Seip , Weighted Paley-Wiener spaces	979



0894-0347(200210)15:4*;1-D