Karlheinz Gröchenig and Michael Leinert, Wiener’s lemma for twisted convolution and Gabor frames ................................................. 1
Allen Knutson, Terence Tao, and Christopher Woodward, The honeycomb model of $GL_n(\mathbb{C})$ tensor products II: Puzzles determine facets of the Littlewood-Richardson cone ................................. 19
Bernard Shiffman and Steve Zelditch, Random polynomials with prescribed Newton polytope ................................................... 49
Markus Keel, Hart F. Smith, and Christopher D. Sogge, Almost global existence for quasilinear wave equations in three space dimensions ........................................................................... 109
David Ben-Zvi and Thomas Nevins, Cusps and $\mathcal{D}$-modules .......... 155
Ivan P. Shestakov and Ualbai U. Umirbaev, Poisson brackets and two-generated subalgebras of rings of polynomials ......................... 181
Ivan P. Shestakov and Ualbai U. Umirbaev, The tame and the wild automorphisms of polynomial rings in three variables ................. 197
C. Sinan Güntürk, Approximating a bandlimited function using very coarsely quantized data: Improved error estimates in sigma-delta modulation ................................................................. 229
Editors

Bernd Sturmfels
Department of Mathematics
University of California at Berkeley
Berkeley, CA 94720-3840 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

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

Lawrence C. Evans
Department of Mathematics
University of California at Berkeley
Berkeley, CA 94720-3840 USA
evans@math.berkeley.edu

Andrei Okounkov
Department of Mathematics
Fine Hall
Princeton University
Princeton, NJ 08544 USA
okounkov@princeton.edu

Associate Editors

Francis Bonahon, University of Southern California
F. Michael Christ, University of California, Berkeley
Constantine M. Dafermos, Brown University
Weinan E, Princeton University
Michael J. Hopkins, Massachusetts Institute of Technology
Ehud Hrushovski, Hebrew University of Jerusalem
Alexander S. Kechris, California Institute of Technology
Grigori A. Margulis, Yale University
Tomasz S. Mrowka, Massachusetts Institute of Technology
Jonathan M. Rosenberg, University of Maryland
Oded Schramm, Microsoft Research
Karen E. Smith, University of Michigan
Richard Stanley, Massachusetts Institute of Technology
Terence Tao, University of California, Los Angeles
Richard L. Taylor, Harvard University
S. R. S. Varadhan, New York University–Courant Institute
Efim Zelmanov, Yale University
Shou-Wu Zhang, Columbia University

Assistant to the Editorial Board

Cheryl A. Cantore
Program in Applied and Computational Mathematics
203 Fine Hall, Washington Road
Princeton University
Princeton, NJ 08544 USA
cheryl@princeton.edu

Editorial Information

As of September 30, 2003, 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 \TeX{} or \LaTeX{} 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. Al-
though 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 _Mathemat-
ics Subject Classification_ representing the primary and secondary subjects of the article.
The classifications are accessible from [www.ams.org/msc/](http://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/](http://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/](http://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 pre-
pared manuscripts, with a strong preference for \texttt{AMSL-\LaTeX}. To this end, the Society
has prepared \texttt{AMSL-\LaTeX} author packages for each AMS publication. Author packages
include instructions for preparing electronic manuscripts, the _AMS Author Handbook_, sam-
ples, and a style file that generates the particular design specifications of that publication
series. Articles properly prepared using the \texttt{AMSL-\LaTeX} 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 \texttt{AMSL-\LaTeX} 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. \texttt{AMSL-\LaTeX} papers also move more efficiently through the production
stream, helping to minimize publishing costs.

\texttt{AMSL-\LaTeX} is the highly preferred format of \TeX{}, but author packages are also available
in \texttt{AMS-\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 \LaTeX{} 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 \texttt{AMSL-\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 \texttt{AMSL-\LaTeX}.

Authors may retrieve an author package from the AMS website starting from [www.ams.
or/](http://www.ams.org/ tex/) or via FTP to [ftp.ams.org](ftp://ftp.ams.org) (login as _anonymous_, enter username as password,
and type \texttt{cd pub/author-info}. The \textit{AMS Author Handbook} and the \textit{Instruction Manual} are available in PDF format following the author packages link from \url{www.ams.org/tex/}.

The author package can also be obtained free of charge by sending email to \texttt{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 \texttt{AMS-\LaTeX} or \texttt{AMS-\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 \texttt{AMS-\LaTeX} or \texttt{AMS-\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 submitted via the Web at \url{www.ams.org/submit-book-journal/}, sent via email to \texttt{pub-submit@ams.org} (Internet), or sent on diskette to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. When sending a manuscript electronically via email or diskette, 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.

\textbf{Electronic graphics.} Comprehensive instructions on preparing graphics are available from \url{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\%.

\textbf{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/](http://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.

**\LaTeX** 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*, \LaTeX files can be downloaded from the AMS website starting from [www.ams.org/journals/](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, \LaTeX 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 \LaTeX 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 \LaTeX production at the AMS sometimes requires extra fonts and macros that are not yet publicly available, \LaTeX files cannot be guaranteed to run through the author’s version of \LaTeX without errors. The AMS regrets that it cannot provide support to eliminate such errors in the author’s \LaTeX 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. 17, No. 1

January 2004

Karlheinz Gröchenig and Michael Leinert, Wiener’s lemma for twisted convolution and Gabor frames ...................................... 1

Allen Knutson, Terence Tao, and Christopher Woodward, The honeycomb model of $GL_n(\mathbb{C})$ tensor products II: Puzzles determine facets of the Littlewood-Richardson cone ............................................. 19

Bernard Shiffman and Steve Zelditch, Random polynomials with prescribed Newton polytope .................................................. 49

Markus Keel, Hart F. Smith, and Christopher D. Sogge, Almost global existence for quasilinear wave equations in three space dimensions ........................................................................................................ 109

David Ben-Zvi and Thomas Nevins, Cusps and $\mathcal{D}$-modules ............ 155

Ivan P. Shestakov and Ualbai U. Umirbaev, Poisson brackets and two-generated subalgebras of rings of polynomials ................................................ 181

Ivan P. Shestakov and Ualbai U. Umirbaev, The tame and the wild automorphisms of polynomial rings in three variables ........... 197

C. Sinan Güntürk, Approximating a bandlimited function using very coarsely quantized data: Improved error estimates in sigma-delta modulation ......................................................................................... 229