
VOLUME 136 NUMBER 4



APRIL 2008

WHOLE NUMBER 586

PROCEEDINGS

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

EDITED BY

Mario Bonk
Richard C. Bradley
Ted Chinburg
Peter A. Clarkson
Walter Craig
Alexander N. Dranishnikov
Ronald A. Fintushel,
 Managing Editor
Paul Goerss
Matthew J. Gursky
Jim Haglund
Jonathan I. Hall
Jane M. Hawkins
Birge Huisgen-Zimmermann
Marius Junge
Nigel J. Kalton
Julia Knight

Bryna Kra
Michael T. Lacey
Gail R. Letzter
Wen-Ching Winnie Li
Martin Lorenz
Ken Ono
Daniel Ruberman
Andreas Seeger
Mei-Chi Shaw
Hart F. Smith
Chuu-Lian Terng
Tatiana Toro
Bernd Ulrich
Edward C. Waymire
Michael I. Weinstein
Richard A. Wentworth
Jon G. Wolfson

PROVIDENCE, RHODE ISLAND USA

ISSN 0002-9939

Available electronically at
www.ams.org/proc/

Proceedings of the American Mathematical Society

This journal is devoted entirely to research in 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. *Proceedings of the American Mathematical Society* is published monthly. Beginning January 1996 *Proceedings* is accessible from www.ams.org/journals/. Subscription prices for Volume 136 (2008) are as follows: for paper delivery, US\$1106 list, US\$885 institutional member, US\$995 corporate member, US\$664 individual member; for electronic delivery, US\$995 list, US\$796 institutional member, US\$896 corporate member, US\$597 individual member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. If ordering the paper version, add US\$32 for surface delivery outside the United States and India; US\$49 to India. Expedited delivery to destinations in North America is US\$75; elsewhere US\$118. 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.)

Proceedings of the American Mathematical Society is published monthly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2294 USA. Periodicals postage is paid at Providence, Rhode Island. Postmaster: Send address changes to *Proceedings*, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

© 2008 by the American Mathematical Society. All rights reserved.

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

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 13 12 11 10 09 08

PROCEEDINGS OF THE AMERICAN MATHEMATICAL SOCIETY

CONTENTS

Vol. 136, No. 4

Whole No. 586

April 2008

A. ALGEBRA, NUMBER THEORY, AND COMBINATORICS

Paolo Lippardini, Every m -permutable variety satisfies the congruence identity $\alpha\beta_h = \alpha\gamma_h$	1137
Lourdes Juan and Arne Ledet, On generic differential SO_n -extensions	1145
Giandomenico Boffi and David A. Buchsbaum, On the Littlewood-Richardson rule for almost skew-shapes	1155
Mikhail Khovanov, Volodymyr Mazorchuk, and Catharina Stroppel, A categorification of integral Specht modules	1163
Sunil K. Chebolu, J. Daniel Christensen, and Ján Mináč, Groups which do not admit ghosts	1171
Ravi A. Rao and Selby Jose, A group structure on squares	1181
Huaning Liu, Mean value of mixed exponential sums	1193
Takesi Kawasaki, On Faltings' annihilator theorem	1205

B. ANALYSIS

Yicheng Liu and Zhixiang Li, Krasnoselskii type fixed point theorems and applications	1213
Gongbao Li and Shuangjie Peng, Remarks on elliptic problems involving the Caffarelli-Kohn-Nirenberg inequalities	1221
Daniel Franco and Pedro J. Torres, Periodic solutions of singular systems without the strong force condition	1229
Stefanie Petermichl, The sharp weighted bound for the Riesz transforms	1237
Hendrik Schubert, Area of Fatou sets of trigonometric functions	1251
Norberto Laghi and Neil Lyall, Strongly singular Radon transforms on the Heisenberg group and folding singularities	1261
Dejan Kolarič, Approximation of holomorphic maps with a lower bound on the rank	1273
Thomas Jech, Algebraic characterizations of measure algebras	1285
H. G. Dales and J. F. Feinstein, Banach function algebras with dense invertible group	1295
Adalberto P. Bergamasco and Sérgio Luís Zani, Globally analytic hypoelliptic vector fields on compact surfaces	1305
John L. Lewis and Kaj Nyström, The boundary Harnack inequality for infinity harmonic functions in the plane	1311
Bálint Farkas, Viktor Harangi, Tamás Keleti, and Szilárd György Révész, Invariant decomposition of functions with respect to commuting invertible transformations	1325
Hong-Ke Du, Yue-Qing Wang, and Gui-Bao Gao, Norms of elementary operators	1337
Piotr Jucha, The Wu metric is not upper semicontinuous	1349
Jacek Jachymski, The contraction principle for mappings on a metric space with a graph	1359
Jingbo Xia, On the compactness of the product of Hankel operators on the sphere	1375
Jan Andres, Randomization of Sharkovskii-type theorems	1385
Fernanda Botelho and James Jamison, Generalized bi-circular projections on minimal ideals of operators	1397
Ariane M. Masuda and Michael E. Zieve, Rational functions with linear relations	1403

D. GEOMETRY

Koen Thas , Solution of a question of Knarr	1409
Luis Guijarro and Gerard Walschap , The dual foliation in open manifolds with nonnegative sectional curvature	1419
Baris Coskunuzer , Properly embedded least area planes in Gromov hyperbolic 3-spaces	1427
Shimpei Kobayashi , Asymptotics of ends of constant mean curvature surfaces with bubbletons	1433

E. LOGIC AND FOUNDATIONS

Albin L. Jones , A polarized partition relation for cardinals of countable cofinality	1445
--	------

G. TOPOLOGY

Julien Melleray , Compact metrizable groups are isometry groups of compact metric spaces	1451
Qiaohua Yang and Fuli Zhu , The heat kernel on H-type groups	1457
Sharon Hollander , Characterizing algebraic stacks	1465
Ross Stokke , Amenability of Banach and C^*-algebras generated by unitary representations	1477
Stephen D. Theriault , The 3-primary classifying space of the fiber of the double suspension	1489

ERRATA

Kathrin Bringmann and Holly Swisher , Erratum to “On a conjecture of Koike on identities between Thompson series and Rogers-Ramanujan functions” ..	1501
B. Doug Park , Erratum to “Exotic smooth structures on $3\mathbb{C}P^2 \# n\overline{\mathbb{C}P^2}$”	1503

Editorial Information

To be published in the *Proceedings*, a paper must be correct, new, nontrivial, and significant. Further, it must be well written and of interest to a substantial number of mathematicians. Piecemeal results, such as an inconclusive step toward an unproved major theorem or a minor variation on a known result, are in general not acceptable for publication. *Proceedings* Editors solicit and encourage publication of worthy papers of length not exceeding 10 published pages. Published pages are the same size as those generated in the style files provided for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$ or $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$.

Information on the backlog for this journal can be found on the AMS website starting from <http://www.ams.org/proc>.

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 out 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. The AMS uses Centralized Manuscript Processing for initial submission. Authors should submit a PDF file using the Initial Manuscript Submission form found at www.ams.org/cgi-bin/peertrack/submission.pl, or send one copy of the manuscript to the following address: Centralized Manuscript Processing, PROCEEDINGS OF THE AMS, 201 Charles Street, Providence, RI 02904-2294 USA. If a paper copy is being forwarded to the AMS, indicate that it is for *Proceedings* and include the name of the corresponding author, contact information such as email address or mailing address, and the name of an appropriate Editor to review the paper (see the list of Editors below).

The first page of an article 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 at least one complete sentence, and at most 150 words. 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/.

Electronically prepared manuscripts. The AMS encourages electronically prepared manuscripts, with a strong preference for $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$. To this end, the Society has prepared $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$ author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, samples, and a style file that generates the particular design specifications of that publication series. Articles properly prepared using the $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$ 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 $\mathcal{T}\mathcal{E}\mathcal{X}$, using $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$ also reduces the amount of technical intervention once the files are received by the AMS. This results in fewer errors in processing and saves the author proofreading time. $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$

papers also move more efficiently through the production stream, helping to minimize publishing costs.

$\mathcal{A}\mathcal{M}\mathcal{S}$ - \LaTeX 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 \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 $\mathcal{A}\mathcal{M}\mathcal{S}$ - \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](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 tech-support@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 $\mathcal{A}\mathcal{M}\mathcal{S}$ - \LaTeX or $\mathcal{A}\mathcal{M}\mathcal{S}$ - \TeX and the publication in which your paper will appear. Please be sure to include your complete email address.

After acceptance. 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 to the Editor, who will forward a copy to the Providence office. Accepted electronically prepared manuscripts can be submitted via the web at www.ams.org/submit-book-journal/, sent via email to 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 e-mail 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.

Electronic graphics. Comprehensive instructions on preparing graphics are available starting 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. 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. 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/. An explanation of each production step is provided on the web through links from the manuscript tracking screen. Questions can be sent to proc-query@ams.org.

T_EX files available upon request. T_EX files are available upon request for authors 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 T_EX 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 proc-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

Editors

The AMS uses Centralized Manuscript Processing for initial submissions to AMS journals. Authors should follow instructions listed on the Initial Submission page found at www.ams.org/proc/procsubmit.html.

Managing Editor: Ronald A. Fintushel, Michigan State University, East Lansing, MI 48824-1027 USA; e-mail: ronfint@math.msu.edu

1. ODE, PDE, GLOBAL ANALYSIS, AND DYNAMICAL SYSTEMS

Coordinating Editor: Chuu-Lian Terng, University of California, Irvine, CA 92697-3875 USA; e-mail: cterng@math.uci.edu

Dynamical systems and ergodic theory, Jane M. Hawkins, CB #3250, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599 USA; e-mail: jmh@math.unc.edu

Ergodic theory and dynamical systems, Bryna Kra, Northwestern University, Mathematics Department, Evanston, IL 60208-2730; e-mail: kra@math.northwestern.edu

Partial differential equations, Matthew J. Gursky, University of Notre Dame, 255 Hurley Hall, Notre Dame, IN 46556-4618 USA; e-mail: mgursky@nd.edu

2. TOPOLOGY AND GEOMETRY

Coordinating Editor: Jon G. Wolfson, Michigan State University, East Lansing, MI 48824-1027 USA; e-mail: wolfson@math.msu.edu

Algebraic topology, Paul Goerss, Northwestern University, Evanston, IL 60208-2730 USA; e-mail: pgoerss@math.northwestern.edu

Differential geometry (Riemannian geometry, complex geometry, and symplectic geometry), Jon G. Wolfson

Geometric analysis (geometric PDE, minimal surfaces, and harmonic maps), Richard A. Wentworth, Johns Hopkins University, Baltimore, MD 21218 USA; e-mail: wentworth@jhu.edu

Geometric topology, Alexander N. Dranishnikov, University of Florida, 358 Little Hall, Gainesville, FL 32611-8105 USA; e-mail: dranish@math.ufl.edu

Low dimensional topology, gauge theory, 4-manifolds, Daniel Ruberman, Brandeis University, Waltham, MA 02254-9110 USA; e-mail: ruberman@brandeis.edu

3. ANALYSIS

Coordinating Editor: Andreas Seeger, University of Wisconsin, Madison, WI 53706 USA; e-mail: seeger@math.wisc.edu

Banach spaces and linear functional analysis, Nigel J. Kalton, University of Missouri, Department of Mathematics, Columbia, MO 65211; e-mail: nigel@math.missouri.edu

Fourier analysis and dispersive PDE, Hart F. Smith, University of Washington, Box 354350, Seattle, WA 98195-4350 USA; e-mail: hart@math.washington.edu

Geometric function theory, Mario Bonk, University of Michigan, Ann Arbor, MI 48109-1043 USA; e-mail: mbonk@umich.edu

Geometric measure theory and its applications, Tatiana Toro, University of Washington, Box 354350, Seattle, WA 98195-4350 USA; e-mail: toro@math.washington.edu

Harmonic analysis, Michael T. Lacey, School of Mathematics, Georgia Institute of Technology, 686 Cherry Street NW, Atlanta, GA 30332-4301 USA; e-mail: lacey@math.gatech.edu

Operator algebras, Marius Junge, University of Illinois at Urbana-Champaign, 1409 W. Green Street, Urbana, IL 61801-2975 USA; e-mail: junge@math.uiuc.edu

Several complex variables, Mei-Chi Shaw, University of Notre Dame, Notre Dame, IN 46556-0398 USA; e-mail: mei-chi.shaw.1@nd.edu

4. ALGEBRA, NUMBER THEORY, COMBINATORICS, AND LOGIC

Coordinating Editor: Martin Lorenz, Temple University, Philadelphia, PA 19122-6094 USA; e-mail: lorenz@temple.edu

Algebraic geometry, Ted Chinburg, University of Pennsylvania, Philadelphia, PA 19104-6395 USA; e-mail: ted@math.upenn.edu

Automorphic forms, number theory, and applications of number theory, Wen-Ching Winnie Li, Pennsylvania State University, University Park, PA 16802-6401 USA; e-mail: wli@math.psu.edu

Combinatorics, Jim Haglund, University of Pennsylvania, 209 S. 33rd Street, Philadelphia, PA 19104-6395 USA; e-mail: jhaglund@math.upenn.edu

Commutative algebra, Bernd Ulrich, Purdue University, West Lafayette, IN 47907-1395 USA; e-mail: ulrich@math.purdue.edu

Group theory, Jonathan I. Hall, Michigan State University, East Lansing, MI 48824-1027 USA; e-mail: jhall@math.msu.edu

Lie algebras and quantized enveloping algebras, Gail R. Letzter; e-mail: letzter.pams@verizon.net

Logic and foundations, Julia Knight, University of Notre Dame, 255 Hurley, Notre Dame, IN 46556-4618 USA; e-mail: knight.1@nd.edu

Noncommutative algebra, Birge Huisgen-Zimmermann, University of California, Santa Barbara, Santa Barbara, CA 93106-3080 USA; e-mail: bhz.pams@math.ucsb.edu

Number theory, Ken Ono, University of Wisconsin, Madison, WI 53706 USA; e-mail: ono@math.wisc.edu

5. APPLIED MATHEMATICS, PROBABILITY, AND STATISTICS

Coordinating Editor: Peter A. Clarkson, Institute of Mathematics, Statistics and Actuarial Science, University of Kent, Canterbury, CT2 7NF, United Kingdom; e-mail: P.A.Clarkson@kent.ac.uk

Applied probability and statistics, Edward C. Waymire, Oregon State University, Corvallis, OR 97331-4605 USA; e-mail: waymire@math.orst.edu

Differential equations, Michael I. Weinstein, Department of Applied Physics and Applied Mathematics, Columbia University, 200 S.W. Mudd MC 4701, New York, NY 10027 USA; e-mail: miw2103@columbia.edu

Integrable systems and special functions, Peter A. Clarkson

Partial differential equations and dynamical systems, Walter Craig, Department of Mathematics and Statistics, McMaster University, Hamilton, Ontario, L8S 4K1 Canada; e-mail: craig@math.mcmaster.ca

Probability, Richard C. Bradley, Indiana University, Bloomington, IN 47405-4301 USA; e-mail: bradleyr@indiana.edu

(Continued from back cover)

Jacek Jachymski , The contraction principle for mappings on a metric space with a graph	1359
Jingbo Xia , On the compactness of the product of Hankel operators on the sphere	1375
Jan Andres , Randomization of Sharkovskii-type theorems	1385
Fernanda Botelho and James Jamison , Generalized bi-circular projections on minimal ideals of operators	1397
Ariane M. Masuda and Michael E. Zieve , Rational functions with linear relations	1403

D. GEOMETRY

Koen Thas , Solution of a question of Knarr	1409
Luis Guijarro and Gerard Walschap , The dual foliation in open manifolds with nonnegative sectional curvature	1419
Baris Coskunuzer , Properly embedded least area planes in Gromov hyperbolic 3-spaces	1427
Shimpei Kobayashi , Asymptotics of ends of constant mean curvature surfaces with bubbletons	1433

E. LOGIC AND FOUNDATIONS

Albin L. Jones , A polarized partition relation for cardinals of countable cofinality	1445
--	------

G. TOPOLOGY

Julien Melleray , Compact metrizable groups are isometry groups of compact metric spaces	1451
Qiaohua Yang and Fuli Zhu , The heat kernel on H-type groups	1457
Sharon Hollander , Characterizing algebraic stacks	1465
Ross Stokke , Amenability of Banach and C^* -algebras generated by unitary representations	1477
Stephen D. Theriault , The 3-primary classifying space of the fiber of the double suspension	1489

ERRATA

Kathrin Bringmann and Holly Swisher , Erratum to “On a conjecture of Koike on identities between Thompson series and Rogers-Ramanujan functions” ..	1501
B. Doug Park , Erratum to “Exotic smooth structures on $3\mathbb{C}P^2 \# n\overline{\mathbb{C}P^2}$ ”	1503

PROCEEDINGS OF THE AMERICAN MATHEMATICAL SOCIETY

CONTENTS

Vol. 136, No. 4

Whole No. 586

April 2008

A. ALGEBRA, NUMBER THEORY, AND COMBINATORICS

Paolo Lipparini, Every m -permutable variety satisfies the congruence identity $\alpha\beta_h = \alpha\gamma_h$ 1137

Lourdes Juan and Arne Ledet, On generic differential SO_n -extensions 1145

Giandomenico Boffi and David A. Buchsbaum, On the Littlewood–Richardson rule for almost skew-shapes 1155

Mikhail Khovanov, Volodymyr Mazorchuk, and Catharina Stroppel, A categorification of integral Specht modules 1163

Sunil K. Chebolu, J. Daniel Christensen, and Ján Mináč, Groups which do not admit ghosts 1171

Ravi A. Rao and Selby Jose, A group structure on squares 1181

Huaning Liu, Mean value of mixed exponential sums 1193

Takesi Kawasaki, On Faltings’ annihilator theorem 1205

B. ANALYSIS

Yicheng Liu and Zhixiang Li, Krasnoselskii type fixed point theorems and applications 1213

Gongbao Li and Shuangjie Peng, Remarks on elliptic problems involving the Caffarelli-Kohn-Nirenberg inequalities 1221

Daniel Franco and Pedro J. Torres, Periodic solutions of singular systems without the strong force condition 1229

Stefanie Petermichl, The sharp weighted bound for the Riesz transforms 1237

Hendrik Schubert, Area of Fatou sets of trigonometric functions 1251

Norberto Laghi and Neil Lyall, Strongly singular Radon transforms on the Heisenberg group and folding singularities 1261

Dejan Kolarič, Approximation of holomorphic maps with a lower bound on the rank 1273

Thomas Jech, Algebraic characterizations of measure algebras 1285

H. G. Dales and J. F. Feinstein, Banach function algebras with dense invertible group 1295

Adalberto P. Bergamasco and Sérgio Luís Zani, Globally analytic hypoelliptic vector fields on compact surfaces 1305

John L. Lewis and Kaj Nyström, The boundary Harnack inequality for infinity harmonic functions in the plane 1311

Bálint Farkas, Viktor Harangi, Tamás Keleti, and Szilárd György Révész, Invariant decomposition of functions with respect to commuting invertible transformations 1325

Hong-Ke Du, Yue-Qing Wang, and Gui-Bao Gao, Norms of elementary operators 1337

Piotr Jucha, The Wu metric is not upper semicontinuous 1349

(Continued on inside back cover)



0002-9939(200804)136:4;1-K