Transactions of the American Mathematical Society
This journal is devoted entirely to research in pure and applied mathematics.

Subscription information. Transactions of the American Mathematical Society is published monthly. Subscription prices for Volumes 341–346 (1994) are $938 list; $750 institutional member. 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 $27; subscribers in India must pay a postage surcharge of $50. Expedited delivery to destinations in North America $38; elsewhere $127.

Back number information. For back issues see the AMS Catalog of Publications.

Subscriptions and orders should be addressed to the American Mathematical Society, P. O. Box 5904, Boston, MA 02206-5904. All orders must be accompanied by payment. Other correspondence should be addressed to P. O. Box 6248, Providence, RI 02940-6248.

Copying and reprinting. Individual readers of this publication, and nonprofit libraries acting for them are permitted to make fair use of the material, such as to copy an article for use in teaching or research. Permission is granted to quote brief passages from this publication in reviews provided the customary acknowledgement of the source is given. Republication, systematic copying, or multiple reproduction of any material in this publication (including abstracts) is permitted only under license from the American Mathematical Society. Requests for such permission should be addressed to the Manager of Editorial Services, American Mathematical Society, P. O. Box 6248, Providence, RI 02940-6248. Requests can also be made by e-mail to reprint-permission@math.ams.org.

The appearance of the code on the first page of an article in this journal indicates the copyright owner's consent for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law, provided that the fee of $1.00 plus $.25 per page for each copy be paid directly to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotion purposes, for creating new collective works, or for resale.

Transactions of the American Mathematical Society is published monthly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2213. Second-class postage is paid at Providence, Rhode Island. Postmaster: Send address changes to Transactions, American Mathematical Society, P. O. Box 6248, Providence, RI 02940-6248.

©Copyright 1979 by the American Mathematical Society. All rights reserved.
Printed in the United States of America.
The paper used in this book is acid-free and falls within the guidelines established to ensure permanence and durability.
10 9 8 7 6 5 4 3 2 99 98 97 96 95 94
AUTHOR INDEX  

Vol. 253  

September 1979  

BATCHelor, Marjorie. The structure of supermanifolds, 329  

Blass, Andreas. Natural endomorphisms of Burnside rings, 121  

Bolthausen, E. On the global asymptotic behavior of Brownian local time on the circle, 317  

Edgar, G. A. and Rosenblatt, J. M. Difference equations over locally compact abelian groups, 273  

Evans, Lawrence C. and Friedman, Avner. Optimal stochastic switching and the Dirichlet problem for the Bellman equation, 365  

Fenton, P. C. On sufficient conditions for harmonicity, 139  

Friedman, Avner and Evans, Lawrence C. Optimal stochastic switching and the Dirichlet problem for the Bellman equation, 365  

Geman, Donald. Dispersion points for linear sets and approximate moduli for some stochastic processes, 257  

Grispolakis, J. and Tymchatyn, E. D. σ-connectedness in hereditarily locally connected spaces, 303  

Hooton, James G. Dirichlet forms associated with hypercontractive semigroups, 237  

Jaco, William and Myers, Robert. An algebraic determination of closed orientable 3-manifolds, 149  

Khosrovshahi, G. B., Levine, H. A. and Payne, L. E. On the positive spectrum of Schrödinger operators with long range potentials, 211  

Latter, Robert H. and Uchiyama, Akihito. The atomic decomposition for parabolic $H^p$ spaces, 391  

Levine, H. A., Payne, L. E. and Khosrovshahi, G. B. On the positive spectrum of Schrödinger operators with long range potentials, 211  

Martin, Alvin Frank. Multiplications on cohomology theories with coefficients, 91  

Myers, Robert and Jaco, William. An algebraic determination of closed orientable 3-manifolds, 149  

Nelson, Robert R. The spaces of functions of finite upper $p$-variation, 171  

Oda, Tadao and Seshadri, C. S. Compactifications of the generalized Jacobian variety, 1  

Payne, L. E., Khosrovshahi, G. B. and Levine, H. A. On the positive spectrum of Schrödinger operators with long range potentials, 211  

Piech, M. Ann. Differentiability of measures associated with parabolic equations on infinite dimensional spaces, 191  

Rosenblatt, J. M. and Edgar, G. A. Difference equations over locally compact abelian groups, 273  

Rudolph, Daniel. Smooth orbit equivalence of ergodic $R^d$ actions, $d > 2$, 291  

Seshadri, C. S. and Oda, Tadao. Compactifications of the generalized Jacobian variety, 1  

Sourour, A. R. Pseudo-integral operators, 339  

Takahasi, Sin-Ei. Dixmier's representation theorem of central double centralizers on Banach algebras, 229  

Tymchatyn, E. D. and Grispolakis, J. $σ$-connectedness in hereditarily locally connected spaces, 303  

Uchiyama, Akihito and Latter, Robert H. The atomic decomposition for parabolic $H^p$ spaces, 391
Editorial Information

To be published in the Transactions, 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. Transactions Editors shall solicit and encourage publication of worthy papers of length exceeding 10 published pages. Published pages are the same size as those generated in the style files provided for \texttt{AMSTeX} or \texttt{AMS-LaTeX}.

As of February 1, 1994, the backlog for this journal was approximately 2 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).

A Copyright Transfer Agreement is required before a paper will be published in this journal. 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 and Editors

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 at least one complete sentence, and at most 300 words. Included with the footnotes to the paper, there should be the 1991 Mathematics Subject Classification representing the primary and secondary subjects of the article. This may be followed by a list of key words and phrases describing the subject matter of the article and taken from it. A list of the numbers may be found in the annual index of Mathematical Reviews, published with the December issue starting in 1990, as well as from the electronic service e-MATH [telnet e-MATH.ams.org (or telnet 130.44.1.100). Login and password are e-math]. For journal abbreviations used in bibliographies, see the list of serials in the latest Mathematical Reviews annual index. 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.

Two copies of the paper should be sent directly to the appropriate Editor and the author should keep one copy.

Electronically prepared manuscripts. The AMS encourages submission of electronically prepared manuscripts in \texttt{AMSTeX} or \texttt{AMS-LaTeX} because properly prepared electronic manuscripts save the author proofreading time and move more quickly through the production process. To this end, the Society has prepared “preprint” style files, specifically the amsspt style of \texttt{AMSTeX} and the amsart style of \texttt{AMS-LaTeX}, which will simplify the work of authors and of the production staff. Those authors who make use of these style files from the
beginning of the writing process will further reduce their own effort. Electronically submitted manuscripts prepared in plain TeX or LaTeX do not mesh properly with the AMS production systems and cannot, therefore, realize the same kind of expedited processing. Users of plain TeX should have little difficulty learning AMS-TeX, and LaTeX users will find that AMS-LATeX is the same as LATeX with additional commands to simplify the typesetting of mathematics.

*Guidelines for Preparing Electronic Manuscripts* provides additional assistance and is available for use with either AMS-TeX or AMS-LATeX. Authors with FTP access may obtain Guidelines from the Society's Internet node e-MATH.ams.org (130.44.1.100). For those without FTP access Guidelines can be obtained free of charge from the e-mail address guide-elec@math.ams.org (Internet) or from the Customer Services Department, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. When requesting Guidelines, please specify which version you want.

At the time of submission, authors should indicate if the paper has been prepared using AMS-TeX or AMS-LATeX. The *Manual for Authors of Mathematical Papers* should be consulted for symbols and style conventions. The Manual may be obtained free of charge from the e-mail address cust-serv@math.ams.org or from the Customer Services Department, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. The Providence office should be supplied with a manuscript that corresponds to the electronic file being submitted.

Electronic manuscripts should be sent to the Providence office immediately after the paper has been accepted for publication. They can be sent via e-mail to pub-submit@math.ams.org (Internet) or on diskettes to the Publications Department, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248. When submitting electronic manuscripts 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. Authors and editors are encouraged to make the necessary submissions of electronically prepared manuscripts and proof copies in a timely fashion.

Any inquiries concerning a paper that has been accepted for publication should be sent directly to the Editorial Department, American Mathematical Society, P. O. Box 6248, Providence, RI 02940-6248.
Editors

Two copies of papers intended for publication in Transactions or Memoirs should be addressed to the appropriate editor. Subjects, and the editors associated with them, follow.

Harmonic analysis, representation theory, and Lie theory to ROBERT J. STANTON, Department of Mathematics, Ohio State University, 231 West 18th Avenue, Columbus, OH 43210-1174; e-mail: stanton@math.ohio-state.edu

Ergodic theory, dynamical systems, abstract analysis to DANIEL J. RUDOLPH, Department of Mathematics, University of Maryland, College Park, MD 20742; e-mail: djr@math.umd.edu

Real and harmonic analysis to DAVID JERISON, Department of Mathematics, Room 2-180, Massachusetts Institute of Technology, Cambridge, MA 02139; e-mail: jericson@math.mit.edu

Algebra and algebraic geometry to EFIM ZELMANOV, Department of Mathematics, University of Wisconsin, 480 Lincoln Drive, Madison, WI 53706-1388; e-mail: zelmanov@math.wisc.edu

Geometric topology, hyperbolic geometry, infinite group theory, and general topology to PETER SHALEN, Department of Mathematics, Statistics and Computer Science, University of Illinois at Chicago, Chicago, IL 60607-4348; e-mail: 10123@uicvm.uic.bitnet

Algebraic topology and differential topology to MARK MAHOWALD, Department of Mathematics, Northwestern University, 2033 Sheridan Road, Evanston, IL 60288-2730; e-mail: mark@math.nwu.edu

Ordinary differential equations, partial differential equations, and applied mathematics to JOHN MALLET-PARET, Division of Applied Mathematics, Brown University, Providence, RI 02912-9000; e-mail: am438000@brownvm.brown.edu

Global analysis and differential geometry to ROBERT L. BRYANT, Department of Mathematics, Duke University, Durham, NC 27706-7706; e-mail: bryant@math.duke.edu

Probability and statistics to RICHARD DURRETT, Department of Mathematics, Cornell University, Ithaca, NY 14853-7901; e-mail: rtd@cornella.cit.cornell.edu

Combinatorics and Lie theory to PHILIP J. HANLON, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1003; e-mail: phil.hanlon@math.lsa.umich.edu

Logic and universal algebra to GREGORY L. CHERLIN, Department of Mathematics, Hill Center, Busch Campus, New Brunswick, NJ 08903; e-mail: cherlin@math.rutgers.edu

Algebraic number theory, analytic number theory, and automorphic forms to WENCHING WINNIE LI, Department of Mathematics, Pennsylvania State University, University Park, PA 16802-6401

Complex analysis and nonlinear partial differential equations to SUN-YUNG A. CHANG, Department of Mathematics, University of California, Los Angeles, CA 90024; e-mail: chang@math.ucla.edu

All other communications to the editors should be addressed to the Managing Editor, PETER SHALEN.

MEMOIRS OF THE AMERICAN MATHEMATICAL SOCIETY

This bimonthly journal is devoted to research in pure and applied mathematics of much the same nature as appears in Transactions. An issue consists of one or more separately bound research tracts for which the author(s) has provided reproduction copy. Prior to 1975 this was published as a monograph series. The editorial committee is identical with that for the Transactions so that papers intended for publication in this series should be addressed to one of the editors.
(Continued from back cover)
Optimal stochastic switching and the Dirichlet problem for the Bellman equation

By Lawrence C. Evans and Avner Friedman

The atomic decomposition for parabolic $H^p$ spaces

By Robert H. Latter and Akihito Uchiyama
Compactifications of the generalized Jacobian variety
By TADAo ODA and C. S. Seshadri.............................................. 1

Multiplications on cohomology theories with coefficients
By ALVIN FRANK MARTIN.......................................................... 91

Natural endomorphisms of Burnside rings
By ANDREAS BLASS........................................................................ 121

On sufficient conditions for harmonicity
By P. C. FENTON............................................................................. 139

An algebraic determination of closed orientable 3-manifolds
By WILLIAM JACO and ROBERT MYERS........................................ 149

The spaces of functions of finite upper p-variation
By ROBERT R. NELSON.................................................................. 171

Differentiability of measures associated with parabolic equations on infinite
dimensional spaces
By M. ANN PIECH.......................................................................... 191

On the positive spectrum of Schrödinger operators with long range potentials
By G. B. KHOSROVSHAHl, H. A. LEVINE and L. E. PAYNE.............. 211

Dixmier's representation theorem of central double centralizers on Banach
algebras
By SIN-EI TAKAHASI..................................................................... 229

Dirichlet forms associated with hypercontractive semigroups
By JAMES G. HOOTON..................................................................... 237

Dispersion points for linear sets and approximate moduli for some stochastic
processes
By DONALD GEMAN....................................................................... 257

Difference equations over locally compact abelian groups
By G. A. EDGAR and J. M. ROSENBLATT......................................... 273

Smooth orbit equivalence of ergodic $\mathbb{R}^d$ actions, $d \geq 2$
By DANIEL RUDOLPH.................................................................... 291

\(s\)-connectedness in hereditarily locally connected spaces
By J. GRISPOLAKIS and E. D. TYMCHATYN................................... 303

On the global asymptotic behavior of Brownian local time on the circle
By E. BOLHAUSEN.......................................................................... 317

The structure of supermanifolds
By MARJORIE BATCHelor................................................................. 329

Pseudo-integral operators
By A. R. SOUROUR........................................................................... 339

(Continued on inside back cover)