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 October 1, 1992, the backlog for this journal was approximately 18 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.

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

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.

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.

Guidelines for Preparing Electronic Manuscripts provide additional assistance and are available for use with either \texttt{AMSTeX} or \texttt{AMS-LaTeX}. Authors with
FTP access may obtain these *Guidelines* from the Society’s Internet node e-MATH.ams.org (130.44.1.100). For those without FTP access they can be obtained free of charge from the e-mail address guide-elec@math.ams.org (Internet) or from the Publications Department, P. O. Box 6248, Providence, RI 02940-6248. When requesting *Guidelines* please specify which version you want.

Electronic manuscripts should be sent to the Providence office only after the paper has been accepted for publication. Please send electronically prepared manuscript files via e-mail to pub-submit@math.ams.org (Internet) or on diskettes to the Publications Department address listed above. When submitting electronic manuscripts please be sure to include a message indicating in which publication the paper has been accepted.

Two copies of the paper should be sent directly to the appropriate Editor and the author should keep one copy. At that time authors should indicate if the paper has been prepared using \( \text{AMS-TEX} \) or \( \text{AMS-LATEX} \). 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 AMS, Customer Services Department, P. O. Box 6248, Providence, RI 02940-6248.

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 AVNER D. ASH, Department of Mathematics, The Ohio State University, 231 West 18th Avenue, Columbus, OH 43210

**Abstract analysis** to MASAMICHI TAKESAKI, Department of Mathematics, University of California, Los Angeles, CA 90024

**Real and harmonic analysis** to DAVID JERISON, Department of Mathematics, Room 2-180, Massachusetts Institute of Technology, Cambridge, MA 02139

**Algebra and algebraic geometry** to JUDITH D. SALLY, Department of Mathematics, Northwestern University, Evanston, IL 60208

**Geometric topology, hyperbolic geometry, infinite group theory, and general topology** to PETER SHALEN, Department of Mathematics, Statistics and Computer Science, University of Illinois, Chicago, IL 60680

**Algebraic topology and differential topology** to MARK MAHOWALD, Department of Mathematics, Northwestern University, 2033 Sheridan Road, Evanston, IL 60288-2730

**Ordinary differential equations, partial differential equations, and applied mathematics** to JOHN MALLET-PARET, Division of Applied Mathematics, Brown University, Providence, RI 02912-9000

**Global analysis and differential geometry** to ROBERT L. BRYANT, Department of Mathematics, Duke University, Durham, NC 27706-7706

**Probability and statistics** to RICHARD DURRETT, Department of Mathematics, Cornell University, Ithaca, NY 14853-7901

**Combinatorics and Lie theory** to PHILIP J. HANLON, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1003

**Logic, set theory, general topology, and universal algebra** to JAMES E. BAUMGARTNER, Department of Mathematics, Dartmouth College, Hanover, NH 03755

**Algebraic number theory, analytic number theory, and automorphic forms** to WEN-CHING 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

All other communications to the editors should be addressed to the Managing Editor, JAMES E. BAUMGARTNER, Department of Mathematics, Dartmouth College, Hanover, NH 03755.

---

**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.
A short proof of Zheludev's theorem
  By F. Gesztesy and B. Simon ........................................... 329
Number of orbits of branch points of $R$-trees
  By Renfang Jiang .......................................................... 341
On Dehn functions and products of groups
  By Stephen G. Brick ...................................................... 369
Subvarieties of moduli space determined by finite groups acting on surfaces
  By John F. X. Ries .......................................................... 385
On the theory of Frobenius extensions and its application to Lie superalgebras
  By Allen D. Bell and Rolf Farnsteiner .................................. 407
Actions of linearly reductive groups on PI-algebras
  By Nikolaus Vonessen ..................................................... 425
A classification of the finite extensions of a multidimensional Bernoulli shift
  By Janet Whalen Kammeyer ................................................ 443
On mapping class groups of contractible open 3-manifolds
   By Robert Myers ............................................. 1
Subgroups of Bianchi groups and arithmetic quotients of hyperbolic 3-space
   By Fritz Grunewald and Joachim Schwermer ..................... 47
Pseudobases in direct powers of an algebra
   By Paul Bankston .............................................. 79
K-theory of Eilenberg-Mac Lane spaces and cell-like mapping problem
   By A. N. Dranishnikov ......................................... 91
Toral actions on 4-manifolds and their classifications
   By M. Ho Kim ................................................... 105
The semigroup property of value functions in Lagrange problems
   By Peter R. Wolenski ........................................... 131
Extensions of étale by connected group spaces
   By David B. Jaffe ............................................. 155
Obstructions and hypersurface sections (minimally elliptic singularities)
   By Kurt Behnke and Jan Arthur Christopberesen ................. 175
Intersection theory of linear embeddings
   By Sean Keel .................................................. 195
Functorial construction of Le Barz’s triangle space with applications
   By Sean Keel .................................................. 213
The first two obstructions to the freeness of arrangements
   By Sergey Yuzvinsky ........................................... 231
A dynamical proof of the multiplicative ergodic theorem
   By Peter Walters .............................................. 245
Inverse monoids, trees, and context-free languages
   By Stuart W. Margolis and John C. Meakin ....................... 259
Quadratic transformation formulas for basic hypergeometric series
   By Mizan Rahman and Arun Verma ................................ 277
Harmonic volume, symmetric products, and the Abel-Jacobi map
   By William M. Faucette ....................................... 303

(Continued on inside back cover)