

## JOURNALS PUBLISHED BY THE AMERICAN MATHEMATICAL SOCIETY

### TRANSLATION JOURNALS

**Soviet Mathematics–Doklady** is a bimonthly translation journal containing the entire pure mathematics section of the DOKLADY AKADEMII NAUK SSSR, the Reports of the Academy of Sciences in the USSR. DOKLADY publishes 500 articles a year, each about four pages long.

**Mathematics of the USSR–Izvestija**, a bimonthly journal is a cover-to-cover translation of IZVESTIJA AKADEMII NAUK SSSR SERIJA MATEMATIČESKAJA, published by the Academy of Sciences of the USSR. This is a journal of current research in all fields of pure mathematics.

**Mathematics of the USSR–Sbornik** is a monthly journal and is a cover-to-cover translation of MATEMATIČESKIĪ SBORNIK (NOVAJA SERIJA), published by the Moscow Mathematical Society and the Academy of Sciences of the USSR. This is a journal of current research in all fields of pure mathematics.

**Theory of Probability and Mathematical Statistics** is the cover-to-cover translation into English of the TEORIJA VEROJATNOSTEĪ I MATEMATIČESKAJA STATISTIKA published by Kiev University, beginning with the 1970 Soviet publication.

**Vestnik of the Leningrad University (Mathematics)** is the complete translation into English of the mathematics section of the VESTNIK LENINGRADSKOGO UNIVERSITETA, beginning with the Soviet publication of 1968. All fields of mathematics are covered.

**Transactions of the Moscow Mathematical Society** is a translation into English of TRUDY MOSKOVSKOGO MATEMATIČESKOGO OBSČESTVA which contains the results of original research in pure mathematics.

**Proceedings of the Steklov Institute of Mathematics** is a translation of the PROCEEDINGS OF THE STEKLOV INSTITUTE OF MATHEMATICS IN THE ACADEMY OF SCIENCES OF THE USSR. Issues contain book length articles or collections of articles pertaining to the same topic.

### CONTENT AND SUBMISSION INFORMATION FOR RESEARCH JOURNALS

**Bulletin (New Series) of the American Mathematical Society.** Contains Research-Expository Papers, Research Announcements and Reviews of Books on Advanced Mathematics. See inside front cover for submission information.

**Mathematics of Computation** is a quarterly journal devoted to original papers in numerical analysis, the application of numerical methods and high-speed calculator devices, the computation of mathematical tables, the theory of high-speed calculating devices, and other aids to computation. In addition, reviews and notes in these and related fields are published. Prospective publications should be sent to the Editor, JAMES H. BRAMBLE, Center for Applied Mathematics, 275 Olin Hall, Cornell University, Ithaca, NY 14853.

**Memoirs of the American Mathematical Society** is a bimonthly journal constituting a series of paperbound research tracts which are of the same general character as the papers published in the TRANSACTIONS. An issue of the MEMOIRS is made up of one or more numbers; a number contains either a single monograph or a group of cognate papers. Copy is supplied by the author; information on preparation of camera copy may be obtained by writing to the Editorial Department of the American Mathematical Society. Papers should be sent to the appropriate editor of TRANSACTIONS.

**Proceedings of the American Mathematical Society** is a monthly journal devoted entirely to research in pure and applied mathematics, principally to the publication of original papers of moderate length. A department called Shorter Notes was established for the purpose of publishing very short papers of an unusually elegant and polished character for which there is normally no other outlet.

**LOGIC AND FOUNDATIONS (03 04)**

Thomas J. Jech, Department of Mathematics, Pennsylvania State University, University Park, Pennsylvania 16802

**COMBINATORICS AND DISCRETE MATHEMATICS (05 15)**

Thomas H. Brylawski, Department of Mathematics, University of North Carolina, Chapel Hill, North Carolina 27514

**COMMUTATIVE ALGEBRA (06 12 13 14 15 18)**

William C. Waterhouse, Department of Mathematics, Pennsylvania State University, University Park, Pennsylvania 16802

**GENERAL ALGEBRA (16 17 18 08)**

Donald Passman, Department of Mathematics, University of Wisconsin, Madison, Wisconsin 53706

**GROUP THEORY (20)**

David M. Goldschmidt, Department of Mathematics, University of California at Berkeley, Berkeley, California 94720

**ALGEBRAIC AND DIFFERENTIAL TOPOLOGY (55 57 58)**

Reinhard E. Schultz, Department of Mathematics, Purdue University, West Lafayette, Indiana 47907

**REAL VARIABLES (26 28 40)**

J. Jerry Uhl, Jr., Department of Mathematics, University of Illinois, Urbana, Illinois 61801

**COMPLEX VARIABLES AND NUMBER THEORY (10 30 31 32)**

W. E. Kirwan, Department of Mathematics, University of Maryland, College Park, Maryland 20742

Lawrence A. Zalcman, Department of Mathematics, University of Maryland, College Park, Maryland 20742

**DIFFERENTIAL EQUATIONS AND DYNAMICAL SYSTEMS (33 34 35 39 49 58)**

George R. Sell, School of Mathematics, University of Minnesota, Minneapolis, Minnesota 55455

**GENERAL ANALYSIS (41 42 43 44 45)**

Richard R. Goldberg, Department of Mathematics, Vanderbilt University, Nashville, Tennessee 37235

**FUNCTIONAL ANALYSIS AND OPERATOR THEORY (46 47)**

Catherine L. Olsen, Department of Mathematics, State University of New York at Buffalo, Buffalo, New York 14214

**FUNCTIONAL ANALYSIS AND CONVEXITY (46 52)**

Robert R. Phelps, Department of Mathematics GN-50, University of Washington, Seattle, Washington 98195

**COMPLEX VARIABLES, FUNCTIONAL ANALYSIS AND OPERATOR THEORY (30 46 47)**

Donald E. Sarason, Department of Mathematics, University of California at Berkeley, Berkeley, California 94720

**LIE GROUPS AND GEOMETRY (22 51 53)**

Jeff Cheeger, Department of Mathematics, State University of New York at Stony Brook, Stony Brook, New York 11794

**GENERAL TOPOLOGY (54)**

David J. Lutzer, Department of Mathematics, Texas Tech University, Lubbock, Texas 79409

Doug W. Curtis, Department of Mathematics, Louisiana State University, Baton Rouge, Louisiana 70803

**PROBABILITY AND OTHER FIELDS (60–99 inclusive)**

Thomas G. Kurtz, Department of Mathematics, University of Wisconsin, Madison, Wisconsin 53706

All other communications should be addressed to the Managing Editor, Richard R. Goldberg, at the above address.

**Transactions of the American Mathematical Society** is a monthly journal devoted entirely to research in pure and applied mathematics and, in general, includes longer papers than those in the PROCEEDINGS. Manuscripts should be submitted to one of the following editors.

Two copies of mathematical papers intended for publication in the TRANSACTIONS or the MEMOIRS should be addressed to one of the editors. Subjects, and the editors associated with them, follow:

Real analysis (excluding harmonic analysis) and applied mathematics to JOEL A. SMOLLER, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109.

Harmonic and complex analysis to R. O. WELLS, JR., Department of Mathematics, Rice University, Houston, TX 77001.

Abstract analysis to WILLIAM B. JOHNSON, Department of Mathematics, Ohio State University, Columbus, OH 43210

Algebra and number theory (excluding universal algebras) to MICHAEL ARTIN, Department of Mathematics, Room 2-239, Massachusetts Institute of Technology, Cambridge, MA 02139.

Logic, foundations, universal algebras and combinatorics to JAN MYCIELSKI, Department of Mathematics, University of Colorado, Boulder, CO 80309.

Topology to WALTER D. NEUMANN, Department of Mathematics, University of Maryland, College Park, MD 20742

Global analysis and differential geometry to TILLA KLOTZ MILNOR, Department of Mathematics, Hill Center, Rutgers University, New Brunswick, NJ 08903

Probability and statistics to STEVEN OREY, School of Mathematics, University of Minnesota, Minneapolis, MN 55455.

All other communications to the editors should be addressed to the Managing Editor, R. O. WELLS, JR.

### REPRINTS AND ADDRESS CHANGES

Any inquiries concerning a paper which has been accepted for publication, including information regarding reprints or changes of address for mailing proof, should be sent directly to the Editorial Department, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940.

### GALLEY PROOF

When a paper with more than one author has been accepted for publication, only one set of galley proof will be sent. Joint authors should, therefore, indicate which of them should receive galley proof in the event that the manuscript is accepted for publication.

### 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 Executive Director, American Mathematical Society, Box 6248, Providence, Rhode Island 02940.

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 copier pay the stated per copy fee through the Copyright Clearance Center, Inc. (For details write Copyright Clearance Center, Inc., 21 Congress Street, Salem, Massachusetts 01970.)

# BULLETIN (New Series) of the American Mathematical Society

## EDITORS

### EDITORIAL BOARD FOR RESEARCH-EXPOSITORY ARTICLES

Hyman Bass	Irving Kaplansky
Felix E. Browder	Peter D. Lax
Chairman	John W. Milnor
S. S. Chern	Hugh L. Montgomery
Fredrick W. Gehring	Gian-Carlo Rota

### EDITORIAL BOARD FOR RESEARCH ANNOUNCEMENTS

Spencer Bloch	Henry P. McKean, Jr.
Charles L. Fefferman	Richard Melrose
Ronald L. Graham	Calvin C. Moore
Melvin Hochster	Chairman
Robert P. Langlands	Yiannis Moschovakis
Richard K. Lashof	I. M. Singer
Harold M. Stark	

BOOK REVIEW EDITOR:	Meyer Jerison
MANAGING EDITOR:	Felix E. Browder

## MANUSCRIPT, PROOF AND COPYING INFORMATION

### SUBMISSION OF MANUSCRIPT

Articles submitted for publication should be typewritten and double spaced. The *Manual for Authors*, available from the Society, should be consulted for symbols and style conventions. Authors should take the greatest possible care in preparing the original manuscript. Hand drawn symbols are satisfactory, if clearly done; directions to the printer should be included where necessary on a separate sheet.

For Research-Expository Articles and Research Announcements, the first footnote should include *subject classification numbers* representing the primary and secondary subjects of the article. The 1980 Mathematics Subject Classification can be found in the December index volumes of *Mathematical Reviews*.

### COPYRIGHT TRANSFER AGREEMENT

The signing of a Copyright Transfer Agreement is a requirement of publication in the BULLETIN. A copy of the agreement is sent to the authors upon receipt of a manuscript in the Providence Office of the Society; in case of joint authors, copies are sent to the author who is designated to receive galley proof. Authors are urged to return the form immediately to prevent delays in processing and publishing of the manuscript. The 1978 edition of the *Manual for Authors* has a description of Society policy concerning copyright and a copy of the agreement.

### PUBLICATION CHARGES

*Research Announcements* carry a page charge of \$40.00 per page to help defray the cost of publication. This amount is charged to the institution or to a contract supporting the research reported in the published paper. The publication charge policy of the United States Federal Council for Science and Technology (FCST) is reported on page 112 of the February, 1975 issue of the NOTICES of the American Mathematical Society. In no case is the author personally responsible for paying the page charge, nor is acceptance of the author's paper for publication dependent upon payment of the page charge.



**RESEARCH – EXPOSITORY PAPERS**

The Jacobian conjecture: Reduction of degree and formal expansion of the inverse  
by Hyman Bass, Edwin H. Connell and David Wright..... 287

Lectures on Morse theory, old and new by Raoul Bott..... 331

The development of square functions in the work of A. Zygmund by E. M. Stein.... 359

**RESEARCH ANNOUNCEMENTS**

New examples of minimal imbeddings of  $S^{n-1}$  into  $S^n(1)$ —the spherical Bernstein  
problem for  $n = 4, 5, 6$  by Wu-yi Hsiang..... 377

Orthogonal polynomials associated with invariant measures on Julia sets by M. F.  
Barnsley, J. S. Geronimo and A. N. Harrington..... 381

The radical in a finitely generated P. I. algebra by Amiram Braun..... 385

The May-Wigner stability theorem for connected matrices by Harold M. Hastings..... 387

Exotic classes for measured foliations by Steven Hurder..... 389

Factorization and extrapolation of weights by José Luis Rubio de Francia..... 393

On the normalizer of certain subalgebras of group-measure factors by Judith Packer.... 397

**BOOK REVIEWS**

History of functional analysis by Jean Dieudonné—Reviewed by R. S. Doran..... 403

Operator inequalities by Johann Schröder—Reviewed by V. Lakshmikantham..... 409

Stochastic filtering theory by G. Kallianpur—Reviewed by Wendell H. Fleming..... 411

Perturbation methods in applied mathematics by J. Kevorkian and J. D. Cole; Intro-  
duction to perturbation techniques by Ali Hasan Nayfeh—Reviewed by R. E.  
O'Malley, Jr..... 414

Circulant matrices by Philip J. Davis—Reviewed by David H. Carlson..... 421

Essays in commutative harmonic analysis by Colin C. Graham and O. Carruth  
McGehee—Reviewed by Carl Herz ..... 422

Operator algebras and quantum statistical mechanics, vols. I and II by Ola Brateli  
and Derek W. Robinson—Reviewed by Shôichirô Sakai..... 425

Global Lorentzian geometry by John K. Beem and Paul E. Ehrlich—Reviewed by  
Gregory J. Galloway..... 427

The Hardy-Littlewood method by R. C. Vaughan—Reviewed by Wolfgang M. Schmidt.. 433

Group theoretic methods in bifurcation theory by D. H. Sattinger—Reviewed by J.  
W. Thomas..... 437

Corrigendum to "Review of product integration" by John D. Dollard and Charles N.  
Friedman—Reviewed by Michael Freedman..... 440

Corrigendum to "The determination of Gauss sums" by Bruce C. Berndt and Ronald  
J. Evans..... 441