TRANSACTIONS OF THE AMERICAN MATHEMATICAL SOCIETY

THIS JOURNAL is devoted entirely to research in pure and applied mathematics, and includes, in general, longer papers than those in the PROCEEDINGS. Papers should be at least 16 typed pages in length.

PREPARATION OF THE MANUSCRIPT. All papers should be typewritten double-spaced, and two copies should be sent to the appropriate editor. The author should keep a complete copy. To encourage the submission of manuscripts in electronic form using TeX and the AMS-TeX macro package, the Executive Committee of the Council has adopted a policy that allows for accelerating the publication date of such manuscripts by as much as 20 weeks, which is approximately equal to the time normally needed by the Society for copyediting, typesetting, and proofreading an average manuscript.

FORM OF MANUSCRIPT. The first page should consist of a descriptive title, followed by an abstract which 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. Also avoid proper names unless mathematical usage associates them with the work. The abstract should be at least one complete sentence, and at most 300 words, with the upper limit primarily for longer papers. Included with the footnotes to your paper, but placed before the first footnote, there should be first the 1980 Mathematics Subject Classification (1985 Revision) representing the primary and secondary subjects of the article, which 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 subject index of Mathematical Reviews, published with the December issue starting in 1984.

SUBMISSION OF MANUSCRIPT. See the back of this journal.

COPYRIGHT TRANSFER AGREEMENT. The signing of a Copyright Transfer Agreement is a requirement for publication.

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 on the original manuscript which of them should receive galley proof in the event that the manuscript is accepted for publication.

BACKLOG. 100 pages. Two-thirds of the papers currently being accepted by the editors will be published in 10–12 months.

SUBSCRIPTION INFORMATION. TRANSACTIONS OF THE AMERICAN MATHEMATICAL SOCIETY is published monthly. Subscription prices for Volumes 305–310 (1988) are $675 list; $540 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 $25; subscribers in India must pay a postage surcharge of $48.

BACK NUMBER INFORMATION. Back number prices per volume are: for Volumes 78–280, $99 list, $79 institutional members; for Volumes 281–286, $114 list, $91 institutional members; for Volumes 287–292, $139 list, $111 institutional members; for Volumes 293–298, $155 list, $124 institutional members; for Volumes 299–304, $166 list, $133 institutional members. Volumes 1–77 may be ordered from Johnson Reprint Corporation, 111 Fifth Avenue, New York, New York 10003. Volumes 1–286 may be purchased on microfilm or microfiche from University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106.

Subscriptions and orders for publications of the American Mathematical Society should be addressed to American Mathematical Society, P. O. Box 1571, Annex Station, Providence, R. I. 02901-9930. All orders must be accompanied by payment. Other correspondence should be addressed to P. O. Box 6248, Providence, R. I. 02940.

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

Copyright © 1988 American Mathematical Society. All rights reserved. Printed in the United States of America Information on Copying and Reprinting can be found at the back of this journal. The paper used in this journal is acid-free and falls within the guidelines established to ensure permanence and durability.
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.

SUBMISSION OF MANUSCRIPT

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.

Ordinary differential equations, partial differential equations, and applied mathematics to ROGER D. NUSSBAUM, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903.

Harmonic analysis, representation theory and Lie theory to ROBERT J. ZIMMER, Department of Mathematics, University of Chicago, Chicago, IL 60637.

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

Classical analysis (including complex, real, and harmonic) to EUGENE FABES, Department of Mathematics, University of Minnesota, Minneapolis, MN 55455.

Algebra, algebraic geometry, and number theory to DAVID J. SALTMAN, Department of Mathematics, University of Texas at Austin, Austin, TX 78713.

Geometric topology and general topology to JAMES W. CANNON, Department of Mathematics, Brigham Young University, Provo, UT 84602.

Algebraic topology and differential topology to RALPH COHEN, Department of Mathematics, Stanford University, Stanford, CA 94305.

Global analysis and differential geometry to JERRY L. KAZDAN, Department of Mathematics, University of Pennsylvania, E1, Philadelphia, PA 19104-6395.

Probability and statistics to RONALD K. GETOOR, Department of Mathematics, University of California at San Diego, La Jolla, CA 92093.

Combinatorics and number theory to CARL POMERANCE, Department of Mathematics, University of Georgia, Athens, GA 30602.

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

Automorphic and modular functions and forms, geometry of numbers, multiplicative theory of numbers, zeta and L functions of number fields and algebras to AUDREY TERRAS, Department of Mathematics, University of California at San Diego, La Jolla, CA 92093.

All other communications to the editors should be addressed to the Managing Editor, RONALD L. GRAHAM, Mathematical Sciences Research Center, AT&T Bell Laboratories, 600 Mountain Avenue, Murray Hill, NJ 07974.

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 acknowledgment 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, P.O. 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 fee of $1.00 plus $.25 per page for each copy be paid directly to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, Massachusetts 01970. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale.
A Riemannian geometric invariant and its applications to a problem of Borel and Serre
By BANG-YEN CHEN and TADASHI NAGANO .......................... 273

Variational principles for Hill's spherical vortex and nearly spherical vortices
By YIEH-HEI WAN ....................................................... 299

Iwasawa's \( \lambda^- \)-invariant and a supplementary factor in an algebraic class number formula
By KUNIAKI HORIE ..................................................... 313

On the zero set of a holomorphic one-form on a compact complex manifold
By MICHAEL J. SPURR .................................................. 329

The Morse Index Theorem where the ends are submanifolds
By DIANE KALISH ......................................................... 341

The blow-up surface for nonlinear wave equations with small spatial velocity
By AVNER FRIEDMAN and LUC OSWALD ............................... 349

Traveling wave solutions of a gradient system: Solutions with a prescribed winding number. I
By DAVID TERNAN .......................................................... 369

Traveling wave solutions of a gradient system: Solutions with a prescribed winding number. II
By DAVID TERNAN .......................................................... 391

Spectrum reducing extension for one operator on a Banach space
By C. J. READ .............................................................. 413

Errata to “Where does the \( L^p \)-norm of a weighted polynomial live?”
By H. N. MHASKAR and E. B. SAFF .................................. 431
## CONTENTS

**Vol. 308, No. 1**  
**July 1988**  
**Whole No. 638**

**Generalized quotients in Coxeter groups**  
By Anders Björner and Michelle L. Wachs  
---  

**On the local boundedness of singular integral operators**  
By Mark Leckband  
---  

**Weighted norm inequalities for potential operators**  
By Martin Schechter  
---  

**Conformal distortion of boundary sets**  
By D. H. Hamilton  
---  

**Subordination families and extreme points**  
By Yusuf Abu-Muhammad and D. J. Hallenbeck  
---  

**Generalized Chebyshev polynomials associated with affine Weyl groups**  
By Michael E. Hoffman and William Douglas Withers  
---  

**Local uncertainty inequalities for locally compact groups**  
By John F. Price and Alladi Sitaram  
---  

**The Brauer group of graded continuous trace $C^*$-algebras**  
By Ellen Maycock Parker  
---  

**Proper knot theory in open 3-manifolds**  
By Peter Churchard and David Spring  
---  

**The closing lemma for generalized recurrence in the plane**  
By Maria Lúcia Alvarenga Peixoto  
---  

**Stable manifolds in the method of averaging**  
By Stephen Schecter  
---  

**Uniformly fat sets**  
By John L. Lewis  
---  

**Euler spaces of analytic functions**  
By James Rovnyak  
---  

**On the complete $GL(n, C)$-decomposition of the stable cohomology of $gl_n(A)$**  
By Phil Hanlon  
---  

**Pseudo-orbit shadowing in the family of tent maps**  
By Ethan M. Coven, Ittai Kan and James A. Yorke  
---  

**Smoothness up to the boundary for solutions of the nonlinear and nonelliptic Dirichlet problem**  
By C. J. Xu and C. ZuiLy  
---  

**Some inequalities for singular convolution operators in $L^p$-spaces**  
By Andreas Seeger  

*(Continued on inside back cover)*