

**Pacific
Journal of
Mathematics**

VOLUME LXXXVI

1980

PACIFIC JOURNAL OF MATHEMATICS

EDITORS

DONALD BABBITT (Managing Editor)

University of California
Los Angeles, California 90024

HUGO ROSSI

University of Utah
Salt Lake City, UT 84112

C. C. MOORE AND ANDREW OGG

University of California
Berkeley, CA 94720

J. DUGUNDJI

Department of Mathematics
University of Southern California
Los Angeles, California 90007

R. FINN AND J. MILGRAM

Stanford University
Stanford, California 94305

ASSOCIATE EDITORS

E. F. BECKENBACH

B. H. NEUMANN

F. WOLF

K. YOSHIDA

SUPPORTING INSTITUTIONS

UNIVERSITY OF BRITISH COLUMBIA
CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIVERSITY OF CALIFORNIA
MONTANA STATE UNIVERSITY
UNIVERSITY OF NEVADA, RENO
NEW MEXICO STATE UNIVERSITY
OREGON STATE UNIVERSITY
UNIVERSITY OF OREGON

UNIVERSITY OF SOUTHERN CALIFORNIA
STANFORD UNIVERSITY
UNIVERSITY OF HAWAII
UNIVERSITY OF TOKYO
UNIVERSITY OF UTAH
WASHINGTON STATE UNIVERSITY
UNIVERSITY OF WASHINGTON

CONTENTS

A — ALGEBRA AND NUMBER THEORY

G. Almkvist, <i>Invariants, mostly old ones</i>	1
H. Bass, <i>Groups of integral representation type</i>	15
A. Bialynicki-Birula, <i>On action of $SL(2)$ on complete algebraic varieties</i>	53
M. Brodmann, <i>Piecewise catenarian and going between rings</i> . .	415
J. P. Buhler, <i>A note on tamely ramified polynomials</i>	421
V. Drobot and S. McDonald, <i>Approximation properties of polynomials with bounded integer coefficients</i>	447
R. C. Heitmann and S. McAdam, <i>Good chains with bad contractions</i>	477
R. T. Hoobler, <i>A cohomological interpretation of Brauer groups of rings</i>	89
P. Jones and S. Ligh, <i>Finite hereditary near-ring-semigroups</i> .	491
I. Kaplansky, <i>Superalgebras</i>	93
J. L. Kleinstein and A. Rosenberg, <i>Succinct and representational Witt rings</i>	99
E. R. Kolchin, <i>On universal extensions of differential fields</i> . .	139
S. Ligh, See P. Jones and S. Ligh	
A. R. Magid, <i>Analytic subgroups of affine algebraic groups, II</i> .	145
S. McAdam, See R. C. Heitmann and S. McAdam	
S. McDonald, See V. Drobot and S. McDonald	
B. Peterson, <i>Extensions of pro-affine algebraic groups II</i> . . .	277
J. H. Reineohl, <i>Lie algebras and affine algebraic groups</i>	287
A. Rosenberg, See J. L. Kleinstein and A. Rosenberg	
M. Rosenlicht, <i>Differential valuations</i>	301
J. B. Sullivan, <i>The second Lie algebra cohomology group and Weyl modules</i>	321
M. E. Sweedler, <i>Right derivations and right differential operators</i>	327
B. F. Wyman, <i>Time varying linear discrete-time systems: II: Duality</i>	361

B — ANALYSIS

G. D. Allen, D. A. Legg and J. D. Ward, <i>Hermitian liftings in Orlicz sequence spaces</i>	379
G. Bachman and A. Sultan, <i>On regular extensions of measures</i> .	389
B. A. Barnes, <i>Representations Naimark-related to *-representations; A correction</i>	397
E. Berkson, <i>One-parameter semigroups of isometries into H^p</i> . .	403
W. L. Bynum, <i>Normal structure coefficients for Banach spaces</i> .	427

II

L. O. Chung, *Biharmonic and polyharmonic principal functions* . 437
 J. Ernest, *The computation of the generalized spectrum of certain Toeplitz operators* 463
 F. P. Greenleaf and M. Moskowitz, *Groups of automorphisms of Lie groups: density properties, bounded orbits, and homogeneous spaces of finite volume* 59
 Y. Katayama, *Isomorphisms of the Fourier algebras in crossed products* 505
 D. A. Legg, See G. D. Allen, D. A. Legg and J. D. Ward
 C. C. Moore, *The Mautner phenomenon for general unitary representations* 155
 M. Moskowitz, See F. P. Greenleaf and M. Moskowitz
 G. M. M. Obi, *An algebraric extension of the Lax-Milgram theorem* 543
 S. G. Pandit, *Differential systems with impulsive perturbations* . 553
 R. Pell, *Support point functions and the Loewner variation* . . 561
 J. Shirey, *On the theorem of Helley concerning finite dimensional subspaces of a dual space* 571
 O. Shisha, *Tchebycheff systems and best partial bases* 579
 A. Sultan, See G. Bachman and A. Sultan
 S. C. Tefteller, *Existence of eigenvalues for second-order differential systems* 601
 J. D. Ward, See G. D. Allen, D. A. Legg and J. D. Ward

C — APPLIED MATHEMATICS

H. Kröger, *Padé approximants on Banach space operator equations* 535

D — GEOMETRY

M. Katchalski and A. Liu, *Symmetric twins and common transversals* 513
 A. Liu, See M. Katchalski and A. Liu
 G. D. Mostow, *On a remarkable class of polyhedra in complex hyperbolic space* 171

G — TOPOLOGY

G. Dula and E. Katz, *Recursion formulas for the homology of $\Omega(X \vee Y)$* 451
 K. R. Goodearl and T. B. Rushing, *Direct limit groups and the Keesling-Mardešić shape fibration* 471
 E. Katz, See G. Dula and E. Katz
 M. A. Khan, *Chain conditions on subgroups of LCA groups* . . 517
 J. H. Rubinstein, *Dehn's lemma and handle decompositions of*

<i>some 4-manifolds</i>	565
T. B. Rushing, See K. R. Goodearl and T. B. Rushing	
M. Smith, <i>Large indecomposable continua with only one composant</i>	593

Pacific Journal of Mathematics

GERT ALMKVIST	1
HYMAN BASS	15
A. BIAŁYNICKI-BIRULA	53
F. P. GREENLEAF and M. MOSKOWITZ	59
RAYMOND T. HOOBLER	89
IRVING KAPLANSKY	93
JERROLD L. KLEINSTEIN and ALEX ROSENBERG	99
E. R. KOLCHIN	139
ANDY R. MAGID	145
CALVIN C. MOORE	155
G. D. MOSTOW	171
BRIAN PETERSON	277
JOHN H. REINOEHL	287
MAXWELL ROSENLICHT	301
JOHN BRENDAN SULLIVAN	321
MOSS E. SWEEDLER	327
BOSTWICK F. WYMAN	361

Subject listing on inside back cover

PACIFIC JOURNAL OF MATHEMATICS

EDITORS

DONALD BABBITT (Managing Editor)

University of California
Los Angeles, CA 90024

HUGO ROSSI

University of Utah
Salt Lake City, UT 84112

C. C. MOORE and ANDREW OGG

University of California
Berkeley, CA 94720

J. DUGUNDJI

Department of Mathematics
University of Southern California
Los Angeles, CA 90007

R. FINN and J. MILGRAM

Stanford University
Stanford, CA 94305

ASSOCIATE EDITORS

E. F. BECKENBACH

B. H. NEUMANN

F. WOLF

K. YOSHIDA

SUPPORTING INSTITUTIONS

UNIVERSITY OF BRITISH COLUMBIA
CALIFORNIA INSTITUTE OF TECHNOLOGY
UNIVERSITY OF CALIFORNIA
MONTANA STATE UNIVERSITY
UNIVERSITY OF NEVADA, RENO
NEW MEXICO STATE UNIVERSITY
OREGON STATE UNIVERSITY
UNIVERSITY OF OREGON

UNIVERSITY OF SOUTHERN CALIFORNIA
STANFORD UNIVERSITY
UNIVERSITY OF HAWAII
UNIVERSITY OF TOKYO
UNIVERSITY OF UTAH
WASHINGTON STATE UNIVERSITY
UNIVERSITY OF WASHINGTON

The Supporting Institutions listed above contribute to the cost of publication of this Journal, but they are not owners or publishers and have no responsibility for its content or policies.

Mathematical papers intended for publication in the *Pacific Journal of Mathematics* should be in typed form or offset-reproduced, (not dittoed), double spaced with large margins. Please do not use built up fractions in the text of the manuscript. However, you may use them in the displayed equations. Underline Greek letters in red, German in green, and script in blue. The first paragraph or two must be capable of being used separately as a synopsis of the entire paper. Please propose a heading for the odd numbered pages of less than 35 characters. Manuscripts, in triplicate, may be sent to any one of the editors. Please classify according to the scheme of Math. Reviews, Index to Vol. 39. Supply name and address of author to whom proofs should be sent. All other communications should be addressed to the managing editor, or Elaine Barth, University of California, Los Angeles, California, 90024.

50 reprints to each author are provided free for each article, only if page charges have been substantially paid. Additional copies may be obtained at cost in multiples of 50.

The *Pacific Journal of Mathematics* is issued monthly as of January 1966. Regular subscription rate: \$84.00 a year (6 Vols., 12 issues). Special rate: \$42.00 a year to individual members of supporting institutions.

Subscriptions, orders for numbers issued in the last three calendar years, and changes of address should be sent to Pacific Journal of Mathematics, P.O. Box 969, Carmel Valley, CA 93924, U.S.A. Older back numbers obtainable from Kraus Periodicals Co., Route 100, Millwood, NY 10546.

PUBLISHED BY PACIFIC JOURNAL OF MATHEMATICS, A NON-PROFIT CORPORATION

Printed at Kokusai Bunken Insatsusha (International Academic Printing Co., Ltd.).
8-8, 3-chome, Takadanobaba, Shinjuku-ku, Tokyo 160, Japan.

Copyright © 1979 by Pacific Journal of Mathematics
Manufactured and first issued in Japan