

Lecture Notes in Mathematics

For information about Vols. 1–758, please contact your book-seller or Springer-Verlag.

- Vol. 759: R. L. Epstein, Degrees of Unsolvability: Structure and Theory. XIV, 216 pages. 1979.
- Vol. 760: H.-O. Georgii, Canonical Gibbs Measures. VIII, 190 pages. 1979.
- Vol. 761: K. Johansson, Homotopy Equivalences of 3-Manifolds with Boundaries. 2, 303 pages. 1979.
- Vol. 762: D. H. Sattinger, Group Theoretic Methods in Bifurcation Theory. V, 241 pages. 1979.
- Vol. 763: Algebraic Topology, Aarhus 1978. Proceedings, 1978. Edited by J. L. Dupont and H. Madsen. VI, 695 pages. 1979.
- Vol. 764: B. Srinivasan, Representations of Finite Chevalley Groups. XI, 177 pages. 1979.
- Vol. 765: Padé Approximation and its Applications. Proceedings, 1979. Edited by L. Wuytack. VI, 392 pages. 1979.
- Vol. 766: T. tom Dieck, Transformation Groups and Representation Theory. VIII, 309 pages. 1979.
- Vol. 767: M. Namba, Families of Meromorphic Functions on Compact Riemann Surfaces. XII, 284 pages. 1979.
- Vol. 768: R. S. Doran and J. Wichmann, Approximate Identities and Factorization in Banach Modules. X, 305 pages. 1979.
- Vol. 769: J. Flum, M. Ziegler, Topological Model Theory. X, 151 pages. 1980.
- Vol. 770: Séminaire Bourbaki vol. 1978/79 Exposés 525–542. IV, 341 pages. 1980.
- Vol. 771: Approximation Methods for Navier-Stokes Problems. Proceedings, 1979. Edited by R. Rautmann. XVI, 581 pages. 1980.
- Vol. 772: J. P. Levine, Algebraic Structure of Knot Modules. XI, 104 pages. 1980.
- Vol. 773: Numerical Analysis. Proceedings, 1979. Edited by G. A. Watson. X, 184 pages. 1980.
- Vol. 774: R. Azencott, Y. Guivarc'h, R. F. Gundy, Ecole d'Eté de Probabilités de Saint-Flour VIII-1978. Edited by P. L. Hennequin. XIII, 334 pages. 1980.
- Vol. 775: Geometric Methods in Mathematical Physics. Proceedings, 1979. Edited by G. Kaiser and J. E. Marsden. VII, 257 pages. 1980.
- Vol. 776: B. Gross, Arithmetic on Elliptic Curves with Complex Multiplication. V, 95 pages. 1980.
- Vol. 777: Séminaire sur les Singularités des Surfaces. Proceedings, 1976-1977. Edited by M. Demazure, H. Pinkham and B. Teissier. IX, 339 pages. 1980.
- Vol. 778: SK₁ von Schiefkörpern. Proceedings, 1976. Edited by P. Draxl and M. Kneser. II, 124 pages. 1980.
- Vol. 779: Euclidean Harmonic Analysis. Proceedings, 1979. Edited by J. J. Benedetto. III, 177 pages. 1980.
- Vol. 780: L. Schwartz, Semi-Martingales sur des Variétés, et Martingales Conformes sur des Variétés Analytiques Complexes. XV, 132 pages. 1980.
- Vol. 781: Harmonic Analysis Iraklion 1978. Proceedings 1978. Edited by N. Petridis, S. K. Pichorides and N. Varopoulos. V, 213 pages. 1980.
- Vol. 782: Bifurcation and Nonlinear Eigenvalue Problems. Proceedings, 1978. Edited by C. Bardos, J. M. Lasry and M. Schatzman. VIII, 296 pages. 1980.
- Vol. 783: A. Dinghas, Wertverteilung meromorpher Funktionen in ein- und mehrfach zusammenhängenden Gebieten. Edited by R. Nevanlinna and C. Andreian Cazacu. XIII, 145 pages. 1980.
- Vol. 784: Séminaire de Probabilités XIV. Proceedings, 1978/79. Edited by J. Azéma and M. Yor. VIII, 546 pages. 1980.
- Vol. 785: W. M. Schmidt, Diophantine Approximation. X, 299 pages. 1980.
- Vol. 786: I. J. Maddox, Infinite Matrices of Operators. V, 122 pages. 1980.
- Vol. 787: Potential Theory, Copenhagen 1979. Proceedings, 1979. Edited by C. Berg, G. Forst and B. Fuglede. VIII, 319 pages. 1980.
- Vol. 788: Topology Symposium, Siegen 1979. Proceedings, 1979. Edited by U. Koschorke and W. D. Neumann. VIII, 495 pages. 1980.
- Vol. 789: J. E. Humphreys, Arithmetic Groups. VII, 158 pages. 1980.
- Vol. 790: W. Dicks, Groups, Trees and Projective Modules. IX, 127 pages. 1980.
- Vol. 791: K. W. Bauer and S. Ruscheweyh, Differential Operators for Partial Differential Equations and Function Theoretic Applications. V, 258 pages. 1980.
- Vol. 792: Geometry and Differential Geometry. Proceedings, 1979. Edited by R. Artzy and I. Vaisman. VI, 443 pages. 1980.
- Vol. 793: J. Renault, A Groupoid Approach to C*-Algebras. III, 160 pages. 1980.
- Vol. 794: Measure Theory, Oberwolfach 1979. Proceedings 1979. Edited by D. Kölzow. XV, 573 pages. 1980.
- Vol. 795: Séminaire d'Algèbre Paul Dubreil et Marie-Paule Malliavin. Proceedings 1979. Edited by M. P. Malliavin. V, 433 pages. 1980.
- Vol. 796: C. Constantinescu, Duality in Measure Theory. IV, 197 pages. 1980.
- Vol. 797: S. Mäki, The Determination of Units in Real Cyclic Sextic Fields. III, 198 pages. 1980.
- Vol. 798: Analytic Functions, Kozubnik 1979. Proceedings. Edited by J. Ławrynowicz. X, 476 pages. 1980.
- Vol. 799: Functional Differential Equations and Bifurcation. Proceedings 1979. Edited by A. F. Izé. XXII, 409 pages. 1980.
- Vol. 800: M.-F. Vignéras, Arithmétique des Algèbres de Quaternions. VII, 169 pages. 1980.
- Vol. 801: K. Floret, Weakly Compact Sets. VII, 123 pages. 1980.
- Vol. 802: J. Bair, R. Fourneau, Etude Géométrique des Espaces Vectoriels II. VII, 283 pages. 1980.
- Vol. 803: F.-Y. Maeda, Dirichlet Integrals on Harmonic Spaces. X, 180 pages. 1980.
- Vol. 804: M. Matsuda, First Order Algebraic Differential Equations. VII, 111 pages. 1980.
- Vol. 805: O. Kowalski, Generalized Symmetric Spaces. XII, 187 pages. 1980.
- Vol. 806: Burnside Groups. Proceedings, 1977. Edited by J. L. Menické. V, 274 pages. 1980.
- Vol. 807: Fonctions de Plusieurs Variables Complexes IV. Proceedings, 1979. Edited by F. Norguet. IX, 198 pages. 1980.
- Vol. 808: G. Maury et J. Raynaud, Ordres Maximaux au Sens de K. Asano. VIII, 192 pages. 1980.
- Vol. 809: I. Gumowski and Ch. Mira, Recurrences and Discrete Dynamic Systems. VI, 272 pages. 1980.
- Vol. 810: Geometrical Approaches to Differential Equations. Proceedings 1979. Edited by R. Martini. VII, 339 pages. 1980.
- Vol. 811: D. Normann, Recursion on the Countable Functionals. VIII, 191 pages. 1980.
- Vol. 812: Y. Namikawa, Toroidal Compactification of Siegel Spaces. VIII, 162 pages. 1980.
- Vol. 813: A. Campillo, Algebroid Curves in Positive Characteristic. V, 168 pages. 1980.
- Vol. 814: Séminaire de Théorie du Potentiel, Paris, No. 5. Proceedings. Edited by F. Hirsch et G. Mokobodzki. IV, 239 pages. 1980.
- Vol. 815: P. J. Slodowy, Simple Singularities and Simple Algebraic Groups. XI, 175 pages. 1980.
- Vol. 816: L. Stoica, Local Operators and Markov Processes. VIII, 104 pages. 1980.

Lecture Notes in Mathematics

Edited by A. Dold and B. Eckmann

966

Algebraic K-Theory

Proceedings of a Conference
Held at Oberwolfach, June 1980
Part I

Edited by R. Keith Dennis



Springer-Verlag
Berlin Heidelberg New York 1982

Editor

R. Keith Dennis
Mathematics Department, Cornell University
Ithaca, NY 14853, USA

AMS Subject Classifications (1980): 18F 25, 12A 62, 13D 15,
16A 54, 20G 10

ISBN 3-540-11965-5 Springer-Verlag Berlin Heidelberg New York
ISBN 0-387-11965-5 Springer-Verlag New York Heidelberg Berlin

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machine or similar means, and storage in data banks. Under § 54 of the German Copyright Law where copies are made for other than private use, a fee is payable to "Verwertungsgesellschaft Wort", Munich.

© by Springer-Verlag Berlin Heidelberg 1982
Printed in Germany

Printing and binding: Beltz Offsetdruck, Hemsbach/Bergstr.
2146/3140-543210

Introduction*

At one time it was possible to invite everyone interested in algebraic K-theory and its varied applications to one conference. However, that is no longer the case due to the enormous growth of the field. For that reason the algebraic K-theory conference held in June of 1980 at the Forschungsinstitut Oberwolfach was to be primarily concerned with lower algebraic K-theory and some limited aspects of higher K-theory. As can be seen from the List of Talks and the Table of Contents, this restriction was not strictly followed, but it did contribute to the success of the conference by serving as a focal point. The papers appearing in these Proceedings are not so limited in scope and reflect the broad interests of the participants. The contents of the two volumes are roughly divided along the following lines: the first volume consists of papers which are either algebraic K-theory proper or are very closely connected with it (in the view of the editor) while the second volume contains those papers which are either applications of algebraic K-theory to other fields or those whose connections with K-theory are less direct.

Many have contributed to the appearance of this volume and I am deeply grateful for their help. In particular, I owe thanks to Dan Grayson for writing up results of Quillen on finite generation, and to Daniel Quillen for allowing their publication here. I would like to thank Howard Hiller and Ulf Rehmann for preparing their excellent survey talks for publication at my request. Mike Stein was a great help in providing information in regards to organizing a conference and editing its proceedings. Clay Sherman and Wilberd van der Kallen provided many hours of help in ways too numerous to mention. The Mathematics Departments at the Universität Bielefeld, Cornell University, and most of all, Texas Tech University, were of great help in preparing these Proceedings for publication. As usual, the staff at the Forschungsinstitut Oberwolfach kept things running smoothly during the conference. The existence of this conference was assured by one person: Winfried Scharlau. He took the initiative at the crucial time.

R. Keith Dennis

* Editors' note: for the sake of completeness we reproduce here the Introduction which appears in Part I of these proceedings (LNM 966) as well as the complete list of talks, and the Contents of both Part I and Part II.

List of Talks

Monday, June 16, 1980

- M. Ojanguren, Quadratic forms and K-theory
- R. Oliver, SK_1 of p-adic group rings
- C. Weibel, Mayer-Vietoris sequences
- D. Carter, Word length in $SL_n(\mathcal{O})$
- W. van der Kallen, Which \mathcal{O} ?

Tuesday, June 17, 1980

- U. Stuhler, Cohomology of arithmetic groups in the function field case
- C. Soulé, Higher p-adic regulators
- H. Lindel, The affine case of Quillen's conjecture
- T. Vorst, The general linear group of polynomial rings over regular rings
- H. Hiller, Affine algebraic K-theory
- F. Waldhausen, Informal session on K-theory of spaces

Wednesday, June 18, 1980

- A. O. Kuku, A convenient setting for equivariant higher algebraic K-theory
- R. W. Sharpe, On the structure of the Steinberg group $St(\Lambda)$
- F. Keune, Generalized Steinberg symbols

Thursday, June 19, 1980

- K. Kato, Galois cohomology and Milnor's K-groups of complete discrete valuation fields
- J. Hurrelbrink, Presentations of $SL_n(\mathcal{O})$ in the real quadratic case
- F. Orecchia, The conductor of curves with ordinary singularities and the computation of some K-theory groups
- A. Suslin, Stability in algebraic K-theory
- J. M. Shapiro, Relations between the Milnor and Quillen K-theory of fields
- E. Friedlander, Informal session on étale K-theory

Friday, June 20, 1980

- U. Rehmann, The congruence subgroup problem for $SL_n(D)$
- A. Bak, The metaplectic and congruence subgroup problems for classical groups G
- G. Prasad, The local and global metaplectic conjecture
- C. Kassel, Homology of $GL_n(\mathbb{Z})$ with twisted coefficients
- J. Huebschmann, Is there a "large" Steinberg group?
- W. Pardon, A "Gersten conjecture" for Witt groups and Witt groups of regular local rings

TABLE OF CONTENTS

PART I

J. BROWKIN:	
Elements of small order in K_2F	1
R. K. DENNIS and K. IGUSA:	
Hochschild homology and the second obstruction for pseudoisotopy	7
A. W. M. DRESS and A. O. KUKU:	
A convenient setting for equivariant higher algebraic K-theory	59
D. R. GRAYSON (after DANIEL QUILLEN):	
Finite generation of K-groups of a curve over a finite field	69
H. HILLER:	
Affine Lie algebras and algebraic K-theory	91
J. HUEBSCHMANN:	
Stem extensions of the infinite general linear group and large Steinberg groups	108
J. HURRELBRINK:	
$K_2(o)$ for two totally real fields of degree three and four	112
C. KASSEL:	
Le groupe $K_3(Z[\epsilon])$ n'a pas de p-torsion pour $p \neq 2$ et 3	115
M. E. KEATING:	
Whitehead groups of dihedral 2-groups	122
M. KOLSTER:	
On injective stability for K_2	128
H. LINDEL:	
On projective modules over polynomial rings over regular rings	169
F. ORECCHIA:	
The conductor of some one-dimensional rings and the computation of their K-theory groups	180
U. REHMANN:	
A survey of the congruence subgroup problem	197
C. SHERMAN:	
Group representations and algebraic K-theory	208
J. R. SILVESTER:	
On the GL_n of a semi-local ring	244
V. SNAITH:	
Asymptotic phenomena in the K-theory of group rings	261
C. SOULÉ:	
Operations on étale K-theory. Applications.	271
A. A. SUSLIN:	
Stability in algebraic K-theory	304
A. A. SUSLIN:	
Mennicke symbols and their applications in the K-theory of fields	334
W. VAN DER KALLEN:	
$SL_3(\mathbb{C}[X])$ does not have bounded word length	357

J. B. WAGONER:	
A picture description of the boundary map in algebraic K-theory	362
C. A. WEIBEL:	
Mayer-Vietoris sequences and mod p K-theory	390

For the convenience of the reader we list here also the contents of Part II of these proceedings, which appear in Lecture Notes in Mathematics vol. 967.

PART II

A. BAK:	
Subgroups of the general linear group normalized by relative elementary groups	1
Z. FIEDOROWICZ, H. HAUSCHILD, and J. P. MAY:	
Equivariant algebraic K-theory	23
D. GUIN:	
Sur le groupe K_3 d'un anneau	81
I. HAMBLETON:	
Projective surgery obstructions on closed manifolds	101
W. C. HSIANG and B. JAHREN:	
A note on the homotopy groups of the diffeomorphism groups of spherical space forms	132
K. IGUSA:	
On the algebraic K-theory of A_∞ -ring spaces	146
P. KAHN:	
Steenrod's problem and k-invariants of certain classifying spaces	195
K. KATO:	
Galois cohomology of complete discrete valuation fields	215
M. KOLSTER:	
Even dimensional projective surgery groups of finite groups	239
A. MATCHETT:	
Exact sequences for locally free class groups	280
M. OJANGUREN:	
Unités représentées par des formes quadratiques ou par des normes réduites.	291
W. PARDON:	
A "Gersten Conjecture" for Witt groups	300
U. STUHLER:	
On the cohomology of SL_n over rings of algebraic functions	316
M. J. TAYLOR:	
A logarithmic description of determinants in group rings	360
S. V. ULLOM:	
Character action on the class group of Fröhlich	371
P. VOGEL:	
Localisation non commutative de formes quadratiques	376
F. WALDHAUSEN:	
Operations in the algebraic K-theory of spaces	390