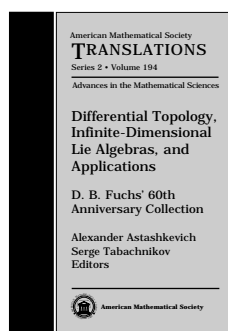


New Publications Offered by the AMS

Algebra and Algebraic Geometry



Differential Topology, Infinite-Dimensional Lie Algebras, and Applications

D. B. Fuchs' 60th Anniversary Collection

Alexander Astashkevich, Renaissance Technologies, East Setauket, NY, and Serge Tabachnikov, University

of Arkansas, Fayetteville, Editors

This volume presents contributions by leading experts in the field. The articles are dedicated to D. B. Fuchs on the occasion of his 60th birthday. Contributors to the book were directly influenced by Professor Fuchs and include his students, friends, and professional colleagues. In addition to their research, they offer personal reminiscences about Professor Fuchs, giving insight into the history of Russian mathematics.

The main topics addressed in this unique work are infinite-dimensional Lie algebras with applications (vertex operator algebras, conformal field theory, quantum integrable systems, etc.) and differential topology. The volume provides an excellent introduction to current research in the field.

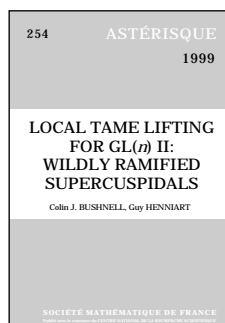
This item will also be of interest to those working in geometry and topology.

Contents: V. I. Arnold, First steps of local symplectic algebra; P. Etingof, Whittaker functions on quantum groups and q -deformed Toda operators; B. Feigin and E. Frenkel, Integrable hierarchies and Wakimoto modules; B. Feigin and S. Loktev, On generalized Kostka polynomials and the quantum Verlinde rule; M. Finkelberg and I. Mirković, Semi-infinite flags. I. Case of global curve \mathbb{P}^1 ; B. Feigin, M. Finkelberg, A. Kuznetsov, and I. Mirković, Semi-infinite flags. II. Local and global intersection cohomology of quasimaps' spaces.; F. Malikov and V. Schechtman, Chiral de Rham complex. II; E. Mukhin and A. Varchenko, On algebraic equations satisfied by hypergeometric solutions of the qKZ equation.; V. Ovsienko and C. Roger, Deforming the Lie algebra of vector fields on S^1

inside the Lie algebra of pseudodifferential symbols on S^1 ; A. Postnikov, B. Shapiro, and M. Shapiro, Algebras of curvature forms on homogeneous manifolds; V. Retakh, C. Reutenauer, and A. Vaintrob, Noncommutative rational functions and Farber's invariants of boundary links; S. Tabachnikov, Remarks on the geometry of exact transverse line fields; B. Tsygan, Formality conjectures for chains; V. A. Vassiliev, On finite order invariants of triple point free plane curves; A. Schwarz, A. Sossinski, C. Roger, B. Feigin, S. Tabachnikov, and A. Astashkevich, Appendix. Personal notes.

American Mathematical Society Translations—Series 2 (Advances in the Mathematical Sciences), Volume 194

August 1999, 313 pages, Hardcover, ISBN 0-8218-2032-X, LC 91-640741, 1991 *Mathematics Subject Classification*: 14F32, 17B65, 58Cxx, **Individual member \$65**, List \$109, Institutional member \$87, Order code TRANS2/194N



Local Tame Lifting for $GL(n)$ II: Wildly Ramified Supercuspidals

Colin J. Bushnell, King's College, London, UK, and Guy Henniart, Université de Paris-Sud, Orsay, France

A publication of Société Mathématique de France.

In this work, the authors discuss the following problem: Let F be a finite extension of the field of p -adic numbers. The Langlands Conjectures relate the representations of the absolute Galois group of F with the representations of general linear groups over F . These conjectures have recently been proved, via global geometric methods, by Harris-Taylor and Henniart.

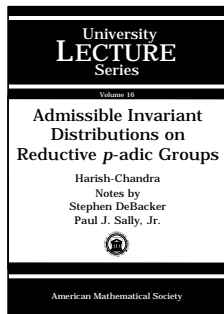
The approach given here uses no global or geometric methods. In the crucial case where the dimension is a power of p , they construct a correspondence exhibiting almost all of the desired properties. This very explicit approach is based on the theory of types of Bushnell-Kutzko and their behavior under base change with respect to tame extensions of F .

Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Notation and Preliminaries; Algebraic tame lifting; Correspondence with Galois representations; Central types; Base field extension for central types; Construction of the tame lift; Automorphic local constants; Gauss sums mod roots of unity; Gauss sum relations; Calculation of the commutator Gauss sum; Comparison with base change; Appendix: Representations of finite groups; Bibliography.

Astérisque, Number 254

April 1999, 105 pages, Softcover, 1991 *Mathematics Subject Classification*: 22E50, 11F70, 11R69, **Individual member \$30**, List \$33, Order code AST/254N



Admissible Invariant Distributions on Reductive p -adic Groups

Harish-Chandra †, Notes by **Stephen DeBacker** and **Paul J. Sally, Jr.**, *University of Chicago, IL*

Harish-Chandra presented these lectures on admissible invariant distributions for p -adic groups at the Institute for Advanced Study in the early 1970s. He published a short sketch of this material as his famous "Queen's Notes". This book, which was prepared and edited by DeBacker and Sally, presents a faithful rendering of Harish-Chandra's original lecture notes.

The main purpose of Harish-Chandra's lectures was to show that the character of an irreducible admissible representation of a connected reductive p -adic group G is represented by a locally summable function on G . A key ingredient in this proof is the study of the Fourier transforms of distributions on \mathfrak{g} , the Lie algebra of G . In particular, Harish-Chandra shows that if the support of a G -invariant distribution on \mathfrak{g} is compactly generated, then its Fourier transform has an asymptotic expansion about any semisimple point of \mathfrak{g} .

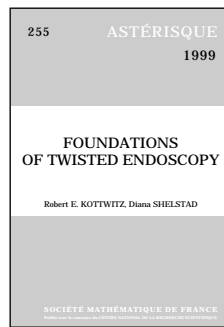
Harish-Chandra's remarkable theorem on the local summability of characters for p -adic groups was a major result in representation theory that spawned many other significant results. This book presents, for the first time in print, a complete account of Harish-Chandra's original lectures on this subject, including his extension and proof of Howe's Theorem.

In addition to the original Harish-Chandra notes, DeBacker and Sally provide a nice summary of developments in this area of mathematics since the lectures were originally delivered. In particular, they discuss quantitative results related to the local character expansion.

Contents: Introduction; Fourier transforms on the Lie algebra; An extension and proof of Howe's Theorem; Theory on the group; Bibliography; List of symbols; Index.

University Lecture Series, Volume 16

August 1999, 97 pages, Softcover, ISBN 0-8218-2025-7, LC 99-31012, 1991 *Mathematics Subject Classification*: 22E50, 22E35, **All AMS members \$16**, List \$20, Order code ULECT/16N



Foundations of Twisted Endoscopy

Robert E. Kottwitz, *University of Chicago, IL*, and **Diana Shelstad**, *Rutgers University, Newark, NJ*

A publication of Société Mathématique de France.

This book develops the foundations of a general theory of twisted

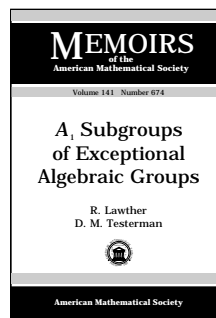
endoscopy by discussing the following: the definition of endoscopic groups, the study of the correspondence between twisted conjugacy classes and conjugacy classes in endoscopic groups, the definition of transfer factors, and finally the stabilization of the elliptic part of the twisted trace formula. The book also develops a theory of duality and Tamagawa numbers for the hypercohomology of complexes $T \rightarrow U$ of tori.

Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Automorphism and L-groups; Endoscopy; Norm mappings; Relative transfer factors; The notion of transfer; Beginning of the stabilization; End of the stabilization; Hypercohomology of complexes of tori over local fields; Inner twists of a group plus automorphism; Hypercohomology of complexes of tori over number fields; Duality for tori over number fields; Tamagawa numbers for complexes of tori; Bibliography.

Astérisque, Number 255

May 1999, 190 pages, Softcover, 1991 *Mathematics Subject Classification*: 11F72, 11R34, 22E50, 22E55, **Individual member \$50**, List \$55, Order code AST/255N



A_1 Subgroups of Exceptional Algebraic Groups

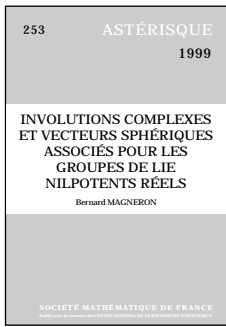
R. Lawther, *Lancaster University, England*, and **D. M. Testerman**, *University of Warwick, Coventry, England*

Contents: Introduction; Labelled diagrams; Essential embeddings; Unipotent classes; Centralizers;

Results; (Aut G)-conjugacy; Tables of A_1 subgroups; References.

Memoirs of the American Mathematical Society, Volume 141, Number 674

August 1999, 131 pages, Softcover, ISBN 0-8218-1966-6, LC 99-27224, 1991 *Mathematics Subject Classification*: 20G15, 20E07, **Individual member \$25**, List \$42, Institutional member \$34, Order code MEMO/141/674N



Involutions Complexes et Vecteurs Sphériques Associés pour les Groupes de Lie Nilpotents Réels

Bernard Magneron, *Université Paris-Nord, Villetaneuse, France*

A publication of Société Mathématique de France.

Monomial representations of a nilpotent Lie group G have been studied successfully during the last few years by several people, including Grélaud, Corwin and Greenleaf, Fujiwara and Lipsman. They are constructed by induction, starting from a unitary character of a G -subgroup.

Starting from a subalgebra \mathfrak{k} of the complexification $\mathfrak{g}^{\mathbb{C}}$ of the Lie algebra \mathfrak{g} of G , and from a form f or \mathfrak{g}^* such that $f([\mathfrak{k}, \mathfrak{k}]) = \{0\}$, one can construct the associated holomorphically induced representation. This gives another way to obtain unitary representations for G , which generalizes the standard method.

This construction was used by Auslander and Kostant in 1971, assuming that \mathfrak{k} is a so-called positive polarization. Their goal was to study irreducible unitary representations of general solvable groups. Since then, no attempts seems to have been made to use this method to consider non-irreducible unitary representations.

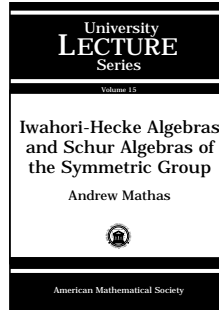
This work is a first attempt to fill in this gap. Benoist's study of the monomial representation associated to the trivial character of the fixed points subgroup for an involution of G , which was carried out in 1985, showed it was a good starting example for studying more general monomial representations. In the same way, Magneron studies here the holomorphically induced representation (ρ, \mathcal{H}) associated to the trivial functional on the fixed points for an involution of $\mathfrak{g}^{\mathbb{C}}$, giving some insight of what might happen in more general instances. Text is in French.

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Contents: Introduction. Contexte de notre étude; Résumé des résultats; Conventions, notations et rappels complémentaires; Les fonctions $\kappa_{\mathfrak{p}}^{\rho}$ et les vecteurs sphériques associés; Géométrie des objets associés à la paire symétrique (\mathfrak{g}, σ) ; Calcul des fonctions $\kappa_{\mathfrak{p}}^{\rho}$ dans certains cas. Conséquences; Récurrences et vecteurs sphériques; Propriétés du cône \mathcal{O}_0 ; Propriétés du cône \mathcal{O} ; Synthèse et résultats principaux; Non nullité de la représentation ρ ; Quelques exemples; Appendice; Bibliographie; Index; Liste des notations.

Astérisque, Number 253

March 1999, 118 pages, Softcover, 1991 *Mathematics Subject Classification*: 22E27, 17B30, 43A85, 17B01, 26C99, **Individual member \$30**, List \$33, Order code AST/253N



Iwahori-Hecke Algebras and Schur Algebras of the Symmetric Group

Andrew Mathas, *University of Sydney, NSW, Australia*

This volume presents a fully self-contained introduction to the modular representation theory of the Iwahori-Hecke algebras of the symmetric

groups and of the q -Schur algebras. The study of these algebras was pioneered by Dipper and James in a series of landmark papers. The primary goal of the book is to classify the blocks and the simple modules of both algebras. The final chapter contains a survey of recent advances and open problems.

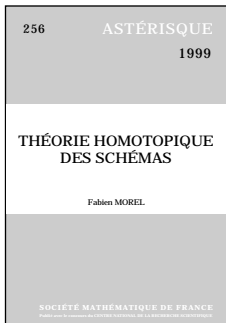
The main results are proved by showing that the Iwahori-Hecke algebras and q -Schur algebras are cellular algebras (in the sense of Graham and Lehrer). This is proved by exhibiting natural bases of both algebras which are indexed by pairs of standard and semistandard tableaux respectively. Using the machinery of cellular algebras, which is developed in chapter 2, this results in a clean and elegant classification of the irreducible representations of both algebras. The block theory is approached by first proving an analogue of the Jantzen sum formula for the q -Schur algebras.

This book is the first of its kind covering the topic. It offers a substantially simplified treatment of the original proofs. The book is a solid reference source for experts. It will also serve as a good introduction to students and beginning researchers since each chapter contains exercises and there is an appendix containing a quick development of the representation theory of algebras. A second appendix gives tables of decomposition numbers.

Contents: The Iwahori-Hecke algebra of the symmetric group; Cellular algebras; The modular representation theory of \mathcal{H} ; The q -Schur algebra; The Jantzen sum formula and the blocks of \mathcal{H} ; Branching rules, canonical bases and decomposition matrices; Finite dimensional algebras over a field; Decomposition matrices; Elementary divisors of integral Specht modules; Index of notation; References; Index.

University Lecture Series, Volume 15

September 1999, approximately 211 pages, Softcover, ISBN 0-8218-1926-7, LC 99-29310, 1991 *Mathematics Subject Classification*: 20C30, 16G99; 05E10, 20G05, 20C20, **All AMS members \$20**, List \$25, Order code ULECT/15N



Théorie Homotopique des Schémas

Fabien Morel, *Université Paris, France*

A publication of Société Mathématique de France.

In this text, the author proposes a general framework to apply the standard methods from homotopy theory to the category of smooth schemes over a reasonable base scheme. It is

shown that some expected properties are satisfied, for example, concerning algebraic K -theory of those schemes. The text is in French.

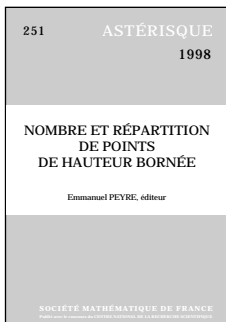
This item will also be of interest to those working in geometry and topology.

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Contents: Introduction; La catégorie homotopique; Excision homotopique, pureté homotopique et éclatements projectifs; Classification homotopique des fibrés vectoriels; Rappels d'algèbre homotopique; Famille ample de fibrés inversibles sur un schéma; Bibliographie.

Astérisque, Number 256

April 1999, 119 pages, Softcover, 1991 *Mathematics Subject Classification*: 55U35, 13D15, 19E08, 19D25, **Individual member \$30**, List \$33, Order code AST/256N



Nombre et Répartition de Points de Hauteur Bornée

Emmanuel Peyre, *Université Louis Pasteur et CNRS, Strasbourg, France*, Editor

A publication of Société Mathématique de France.

If the rational points of a variety over a number field are Zariski dense, then

it is natural to equip this variety with heights, which one can interpret as intersection degrees relative to metrized line bundles. The aim is to study the set of points of bounded height asymptotically and to relate the results to the geometry of the variety.

This volume presents articles from two seminars held in Paris that featured the following speakers and topics: Slater and Swinnerton-Dyer, Heath-Brown, Fouvry and de la Bretèche on cubic surfaces, Billard on minimal models of rational surfaces, and Batyrev and Tschinkel, Salberger, and Peyre on the conjectural interpretation of the dominant term in the asymptotic behavior of the number of points with bounded height.

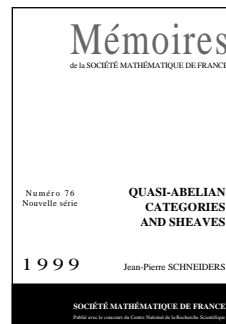
This item will also be of interest to those working in number theory.

Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a 30% discount from list.

Contents: J. B. Slater and P. Swinnerton-Dyer, Counting points on cubic surfaces, I; R. Heath-Brown, Counting rational points on cubic surfaces; E. Fouvry, Sur la hauteur des points d'une certaine surface cubique singulière; R. de la Bretèche, Sur le nombre de points de hauteur bornée d'une certaine surface cubique singulière; H. Billard, Répartition des points rationnels des surfaces géométriquement réglées rationnelles; P. Salberger, Tamagawa measures on universal torsors and points of bounded height on Fano varieties; E. Peyre, Terme principal de la fonction zêta des hauteurs et torseurs universels; V. V. Batyrev and Y. Tschinkel, Tamagawa numbers of polarized algebraic varieties.

Astérisque, Number 251

January 1999, 340 pages, Softcover, 1991 *Mathematics Subject Classification*: 11G35; 14G05, 11E76, 14M25, 14G10, **Individual member \$79**, List \$88, Order code AST/251N



Quasi-Abelian Categories and Sheaves

Jean-Pierre Schneiders, *Université Paris 13, Villetaneuse, France*

A publication of Société Mathématique de France.

This memoir is divided in three parts. In the first, Schneiders introduces the

notion of quasi-abelian categories and links the homological algebra of these categories to that of their abelian envelopes. Quasi-abelian categories form a special class of non-abelian additive categories that contain in particular the category of locally convex topological vector spaces and the category of filtered abelian groups.

In the second part, what is meant by an elementary quasi-abelian category is defined, and it is shown that sheaves with values in such a category can be manipulated almost as easily as sheaves of abelian groups. In particular, Schneiders establishes that Poincaré-Verdier duality and the projection formula hold in this context.

The third part of the volume is devoted to an application of the results obtained to the cases of filtered and topological sheaves.

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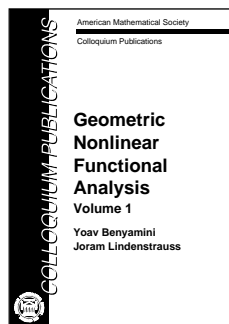
Contents: Introduction; Quasi-abelian categories; Sheaves with values in quasi-abelian categories; Applications; Bibliography.

Mémoires de la Société Mathématique de France, Number 76

March 1999, 140 pages, Softcover, ISBN 2-85629-074-4, 1991 *Mathematics Subject Classification*: 18G50, 18F20, 46M20, **Individual member \$30**, List \$33, Order code SMFMEM/76N

Analysis

Advance Notice



Geometric Nonlinear Functional Analysis Volume 1

Yoav Benyamini, *Technion—Israel Institute of Technology, Haifa, Israel*, and Joram Lindenstrauss, *Hebrew University, Jerusalem, Israel*

The book presents a systematic and unified study of geometric nonlinear functional analysis. This area has its classical roots in the beginning of the twentieth century and is now a very active research area, having close connections to geometric measure theory, probability, classical analysis, combinatorics, and Banach space theory.

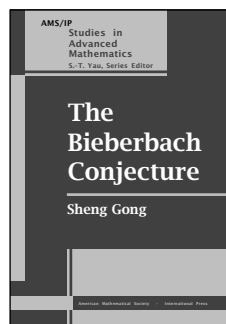
The main theme of the book is the study of uniformly continuous and Lipschitz functions between Banach spaces (e.g., differentiability, stability, approximation, existence of extensions, fixed points, etc.). This study leads naturally also to the classification of Banach spaces and of their important subsets (mainly spheres) in the uniform and Lipschitz categories.

Many recent rather deep theorems and delicate examples are included with complete and detailed proofs. Challenging open problems are described and explained, and promising new research directions are indicated.

Contents: Introduction; Retractions, extensions and selections; Retractions, extensions and selections (special topics); Fixed points; Differentiation of convex functions; The Radon-Nikodým property; Negligible sets and Gâteaux differentiability; Lipschitz classification of Banach spaces; Uniform embeddings into Hilbert space; Uniform classification of spheres; Uniform classification of Banach spaces; Nonlinear quotient maps; Oscillation of uniformly continuous functions on unit spheres of finite-dimensional subspaces; Oscillation of uniformly continuous functions on unit spheres of infinite-dimensional subspaces; Perturbations of local isometries; Perturbations of global isometries; Twisted sums; Group structure on Banach spaces; Appendices; Bibliography; Index.

Colloquium Publications

November 1999, approximately 313 pages, Hardcover, ISBN 0-8218-0835-4, LC 99-17734, 1991 *Mathematics Subject Classification*: 46-XX; 22-XX, 28-XX, 47-XX, 52-XX, 54-XX, **All AMS members \$52**, List \$65, Order code COLL-LINDENSTRAN



The Bieberbach Conjecture

Sheng Gong, *Academia Sinica, Beijing, People's Republic of China*

In 1919, Bieberbach posed a seemingly simple conjecture. That “simple” conjecture challenged mathematicians in complex analysis for the following 68 years! In that time, a huge number of papers discussing the conjecture

and its related problems were inspired. Finally in 1984, de Branges completed the solution.

In 1989, Professor Gong wrote and published a short book in Chinese, *The Bieberbach Conjecture*, outlining the history of the related problems and de Branges’ proof. The present volume is the English translation of that Chinese edition with modifications by the author. In particular, he includes results related to several complex variables. Open problems and a large number of new mathematical results motivated by the Bieberbach conjecture are included.

Completion of a standard one-year graduate complex analysis course will prepare the reader for understanding the book. It would make a nice supplementary text for a topics course at the advanced undergraduate or graduate level.

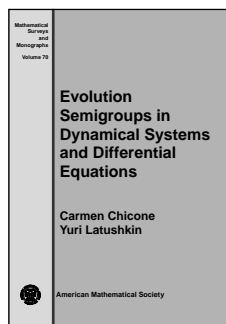
Titles in this series are co-published with International Press, Cambridge, MA.

Contents: Introduction; Löwner theory; Grunsky inequality; De Branges theorem; Several complex variable cases; References; List of symbols; Index.

AMS/IP Studies in Advanced Mathematics, Volume 12

August 1999, 201 pages, Hardcover, ISBN 0-8218-0655-6, LC 99-26584, 1991 *Mathematics Subject Classification*: 30C50, **All AMS members \$23**, List \$29, Order code AMSIP/12N

Differential Equations



Evolution Semigroups in Dynamical Systems and Differential Equations

Carmen Chicone and Yuri Latushkin, *University of Missouri, Columbia*

The main theme of the book is the spectral theory for evolution operators and evolution semigroups, a subject tracing its origins to the classical results of J. Mather on hyperbolic dynamical systems and J. Howland on nonautonomous Cauchy problems. The authors use a wide range of methods and offer a unique presentation.

The authors give a unifying approach for a study of infinite-dimensional nonautonomous problems, which is based on the

consistent use of evolution semigroups. This unifying idea connects various questions in stability of semigroups, infinite-dimensional hyperbolic linear skew-product flows, translation Banach algebras, transfer operators, stability radii in control theory, Lyapunov exponents, magneto-dynamics and hydro-dynamics. Thus the book is much broader in scope than existing books on asymptotic behavior of semigroups.

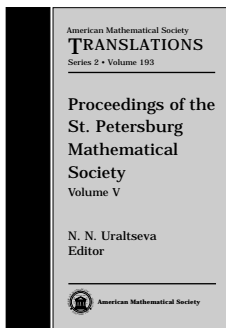
Included is a solid collection of examples from different areas of analysis, PDEs, and dynamical systems. This is the first monograph where the spectral theory of infinite dimensional linear skew-product flows is described together with its connection to the multiplicative ergodic theorem; the same technique is used to study evolution semigroups, kinematic dynamo, and Ruelle operators; the theory of stability radii, an important concept in control theory, is also presented. Examples are included and non-traditional applications are provided.

Contents: Introduction; Semigroups on Banach spaces and evolution semigroups; Evolution families and Howland semigroups; Characterizations of dichotomy for evolution families; Two applications of evolution semigroups; Linear skew-product flows and Mather evolution semigroups; Characterizations of dichotomy for linear skew-product flows; Evolution operators and exact Lyapunov exponents; Bibliography; List of notations; Index.

Mathematical Surveys and Monographs, Volume 70

September 1999, 361 pages, Hardcover, ISBN 0-8218-1185-1, LC 99-23729, 1991 *Mathematics Subject Classification*: 47D, 34C; 47B, 58F, **Individual member \$47**, Institutional member \$63, Order code SURV/70N

General and Interdisciplinary



Proceedings of the St. Petersburg Mathematical Society Volume V

N. N. Uraltseva, *St. Petersburg State University, Russia*, Editor

This volume contains 10 papers with new results on problems in mathematical physics, differential equations,

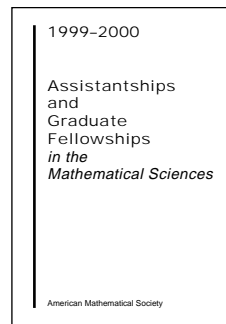
and probability. Included also is an article on the dramatic history of mathematics in Leningrad in the 1930s.

Contents: V. A. Boichenko and G. A. Leonov, Lyapunov functions, Lozinskii norms, and the Hausdorff measure in the qualitative theory of differential equations; R. R. Gadyl'shin, A system of embedded resonators; A. V. Ivanov, Some qualitative properties of equations of slow, normal, and fast diffusion type; A. V. Ivanov, V. V. Nekrutkin, and N. I. Tur, Asymptotic expansions in propagation of chaos for Boltzmann type equations; S. A. Nazarov, Asymptotic conditions at a point, selfadjoint extensions of operators, and the method of matched asymptotic expansions; G. A. Seregin and J. Frehse, Regularity of solutions to variational problems of the deformation theory of plasticity with logarithmic hardening; A. L. Skubachevskii and E. L. Tsvetkov, General boundary-value problems for elliptic differential-difference equations;

Ch. Suquet, Tightness in Schauder decomposable Banach spaces; M. B. Tabanov, Normal forms of equations of wave functions in new natural ellipsoidal coordinates; V. S. Rabinovich, Criterion for local invertibility of pseudodifferential operators with operator symbols and some applications; N. S. Ermolaeva, On the so-called Leningrad mathematical front.

American Mathematical Society Translations—Series 2, Volume 193

August 1999, 271 pages, Hardcover, ISBN 0-8218-1390-0, 1991 *Mathematics Subject Classification*: 01A, 35J, 35K, 35R, 35S, 53A, 58F, 60B, 60F, 60G, 60J, 73E, **Individual member \$59**, List \$99, Institutional member \$79, Order code TRANS2/193N



Assistantships and Graduate Fellowships in the Mathematical Sciences, 1999-2000

Review of the previous annual edition:

What makes this directory unusual is the additional information provided about the department. The AMS has provided for each department the number of tenured faculty that have

published within the last three years and a breakdown of the financial support available to graduate students as well as the kind of work required to obtain support. From a student's point of view, these additional data are vital in the selection process. The American Mathematical Society has provided a valuable aid to students in the mathematical sciences. This guide is highly recommended for any academic institution with an undergraduate mathematics major.

—*American Reference Books Annual*

This publication is an indispensable source of information for students seeking support for graduate study in the mathematical sciences. Providing data from a broad range of academic institutions, it is also a valuable resource for mathematical sciences departments and faculty.

Assistantships and Graduate Fellowships brings together a wealth of information about resources available for graduate study in mathematical sciences departments in the U.S. and Canada. Information on the number of faculty, graduate students, and degrees awarded (bachelor's, master's, and doctoral) is listed for each department when available. Stipend amounts and the number of awards available are given, as well as information about foreign language requirements. Numerous display advertisements from mathematical sciences departments throughout the country provide additional information.

Also listed are sources of support for graduate study and travel, summer internships, and graduate study in the U.S. for foreign nationals. Finally, a list of reference publications for fellowship information makes *Assistantships and Graduate Fellowships* a centralized and comprehensive resource.

October 1999, approximately 130 pages, Softcover, ISBN 0-8218-2011-7, 1991 *Mathematics Subject Classification*: 00, **Individual member \$12**, List \$20, Order code ASST/99N

Advance Notice



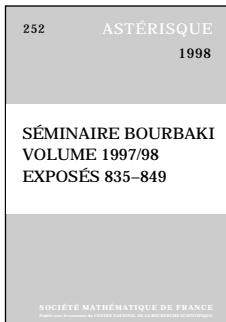
Combined Membership List 1999-2000

The *Combined Membership List* (CML) is a comprehensive directory of the membership of the American Mathematical Society, the American Mathematical Association of Two-Year Colleges, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

There are two lists of individual members. The first is a complete alphabetical list of all members in all four organizations. For each member, the CML provides his or her address, title, department, institution, telephone number (if available), and electronic address (if indicated), and also indicates membership in the four participating societies. The second is a list of individual members according to their geographic locations. In addition, the CML lists academic, institutional, and corporate members of the four participating societies providing addresses and telephone numbers of mathematical sciences departments.

The CML is distributed on request to AMS members in even-numbered years. MAA members can request the CML in odd-numbered years from the MAA. The CML is an invaluable reference for keeping in touch with colleagues and for making connections in the mathematical sciences community in the United States and abroad.

December 1999, approximately 376 pages, Softcover, ISBN 0-8218-1997-6, 1991 *Mathematics Subject Classification*: 00, **Individual member \$37**, List \$62, Institutional member \$50, Order code CML/1999/2000N



Séminaire Bourbaki, Volume 1997/98, Exposés 835-849

A publication of Société Mathématique de France.

The talks at Bourbaki seminars are devoted to the most important topics of current research interest. This volume contains 15 lectures (given in 1997/98) on the following subjects:

differential Galois theory, Riemannian geometry, symplectic geometry, Hecke algebras, quasi-crystals, quantization of Poisson manifolds, integrable systems and quantum field theory, sieve methods, loop spaces of compact Lie groups, Lie algebras, eigenvalues of hermitian matrices, quantum cohomology of projective hypersurfaces, fundamental groups of curves in algebraic geometry, the K -theory of C^* -algebras, and zeta functions.

Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a 30% discount from list.

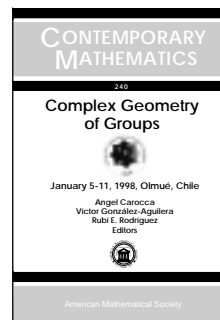
Contents: *Novembre 1997:* S. Gallot, Volumes, courbure de Ricci et convergence des variétés; M. Geck, Representations of Hecke algebras at roots of unity; Y. Hellegouarch, Fonctions

zêta en caractéristique positive et modules de Carlitz-Hayes; A. Katz, Introduction aux quasicristaux; P. Van Moerbeke, Algèbres \mathcal{W} et équations non-linéaires; *Mars 1998:* G. Faltings, Curves and their fundamental groups; P. Julg, Travaux de N. Higson et G. Kasparov sur la conjecture de Baum-Connes; P. Michel, Progrès récents du crible et applications; J. Oesterlé, Quantification formelle des variétés de Poisson; J.-C. Sikorav, Construction de sous-variétés symplectiques; *Juin 1998:* W. Fulton, Eigenvalues of sums of Hermitian matrices; L. Gross, Harmonic functions on loop groups; P. Littelmann, Bases canoniques et applications; R. Pandharipande, Rational curves on hypersurfaces; M. Van Der Put, Recent work on differential Galois theory.

Astérisque, Number 252

March 1999, 367 pages, Softcover, 1991 *Mathematics Subject Classification*: 53C23, 53C20, 53C21, 52A40, 52A38, 58E20, 58Cxx, 58E35, 20C20, 17B37, 11G09, 11R58, 11T55, 82D25, 51M20, 52C17, 52C15, 52C20, 52C22, 15A52, 82B44, 82O55, 35Q53, 47N30, 60H25, 22E70, 58G37, 47G30, 14H30, 35L20, 35B27, 78A05, 11L20, 11N32, 11N35, 11N36, 11N75, 81S10, 53C15, 58F05, 32L99, 32J25, 26C99, 14P10, 15A18, 14M15, 14L30, 15A42, 58G32, 22E30, 22C05, 20G20, 22E46, 14N10, 14H10, 14E99, 39A10, 11Fxx, 11Gxx, 13Nxx, 12H05, **Individual member \$79**, List \$88, Order code AST/252N

Geometry and Topology



Complex Geometry of Groups

Angel Carocca, Pontificia Universidad Católica de Chile, Santiago, Chile, Victor González-Aguilera, Universidad Técnica Federico Santa María, Valparaíso, Chile, and Rubí E. Rodríguez, Pontificia Universidad Católica de Chile, Santiago, Editors

This volume presents the proceedings of the **I Iberoamerican Congress on Geometry: Cruz del Sur** held in Olmué, Chile. The main topic was "The Geometry of Groups: Curves, Abelian Varieties, Theoretical and Computational Aspects". Participants came from all over the world.

The volume gathers the expanded contributions from most of the participants in the Congress. Articles reflect the topic in its diversity and unity, and in particular, the work done on the subject by Iberoamerican mathematicians. Original results and surveys are included on the following areas: curves and Riemann surfaces, abelian varieties, and complex dynamics. The approaches are varied, including Kleinian groups, quasiconformal mappings and Teichmüller spaces, function theory, moduli spaces, automorphism groups, algebraic geometry, and more.

Contents: R. E. Rodríguez, Complex geometry in Chile: Panorama and perspectives; W. Abikoff, Quasiconformal conjugation of Möbius transformations; R. Bamón, A family of n -dimensional differential equations with Lorenz-like attractors; C. Birkenhake, H. Lange, and V. González-Aguilera, Automorphisms of 3-dimensional abelian varieties; L. Brambila-Paz, L. Hidalgo-Solís, and J. Muciño-Raymundo, On restrictions of the Picard bundle;

A. M. Castro, Representations of triangle groups in the Heisenberg group; **M. Chuaqui** and **B. Osgood**, Recent progress on the geometry of univalence criteria; **A. F. Costa** and **A. M. Porto**, On anticonformal automorphisms of order > 2 of Riemann; **C. J. Earle**, **F. P. Gardiner**, and **N. Lakic**, Isomorphisms between generalized Teichmüller spaces; **H. M. Farkas** and **I. Kra**, Ramanujan partition identities; **H. M. Farkas** and **I. Kra**, A function theoretic approach to the Ramanujan partition identities with applications to combinatorial number theory; **F. Gardiner** and **L. Keen**, Holomorphic motions and quasifuchsian manifolds; **L. Giraldo**, **X. Gómez-Mont**, and **P. Mardešić**, Computation of topological numbers via linear algebra: hypersurfaces, vector fields and vector fields on hypersurfaces; **E. Gómez González**, Cyclic coverings of a smooth curve and branch locus of the moduli space of smooth curves; **W. J. Harvey** and **G. González-Díez**, Subvarieties of moduli space for Riemann surfaces; **R. A. Hidalgo**, Noded function groups; **L. Hidalgo-Solis** and **S. Recillas-Pishmish**, The hyperelliptic fibre of the Prym map in genus four; **J. Kiwi**, From the shift loci to the connectedness loci of complex polynomials; **Y. A. Kopylov**, Some properties of the operator of exterior derivation on surfaces of revolution and L_p -cohomology; **B. Maskit**, Matrices for Fenchel-Nielsen parameters in genus 2; **T. Nakanishi**, **M. Nääänen**, and **G. Rosenberger**, Arithmetic Fuchsian groups of signature $(0; e_1, e_2, e_3, e_4)$ with $2 \leq e_1 \leq e_2 \leq e_3, e_4 = \infty$; **J. R. Quine**, Geometric and holomorphic moduli for extremal Riemann surfaces.

Contemporary Mathematics, Volume 240

September 1999, 286 pages, Softcover, ISBN 0-8218-1381-1, LC 99-30206, 1991 *Mathematics Subject Classification*: 30Fxx; 14Hxx, 14Kxx, **Individual member \$41**, List \$69, Institutional member \$55, Order code CONM/240N

Recommended Text

4-Manifolds and Kirby Calculus

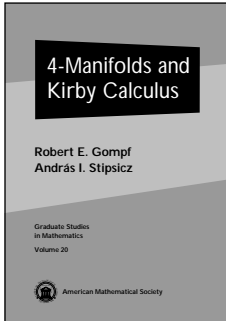
Robert E. Gompf, *University of Texas, Austin*, and **András I. Stipsicz**, *ELTE, TTK, Budapest, Hungary*

The past two decades have brought explosive growth in 4-manifold theory. Many books are currently appearing that approach the topic from view-

points such as gauge theory or algebraic geometry. This volume, however, offers an exposition from a topological point of view. It bridges the gap to other disciplines and presents classical but important topological techniques that have not previously appeared in the literature.

Part I of the text presents the basics of the theory at the second-year graduate level and offers an overview of current research. Part II is devoted to an exposition of Kirby calculus, or handlebody theory on 4-manifolds. It is both elementary and comprehensive. Part III offers in depth a broad range of topics from current 4-manifold research. Topics include branched coverings and the geography of complex surfaces, elliptic and Lefschetz fibrations, h -cobordisms, symplectic 4-manifolds, and Stein surfaces.

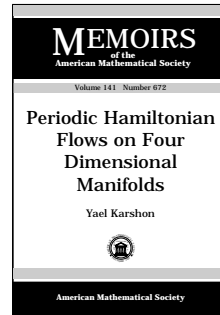
Applications are featured, and there are over 300 illustrations and numerous exercises with solutions in the book.



Contents: *4-manifolds*: Introduction; Surfaces in 4-manifolds; Complex surfaces; *Kirby calculus*: Handelbodies and Kirby diagrams; Kirby calculus; More examples; *Applications*: Branched covers and resolutions; Elliptic and Lefschetz fibrations; Cobordisms, h -cobordisms and exotic \mathbb{R}^4 s; Symplectic manifolds; Stein surfaces; *Appendices*: Solutions; Notation, important figures; Bibliography; Index.

Graduate Studies in Mathematics, Volume 20

October 1999, approximately 576 pages, Hardcover, ISBN 0-8218-0994-6, LC 99-29942, 1991 *Mathematics Subject Classification*: 57N13; 57R65, 53C15, **All AMS members \$52**, List \$65, Order code GSM/20N



Periodic Hamiltonian Flows on Four Dimensional Manifolds

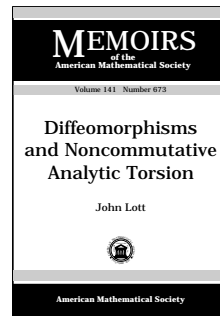
Yael Karshon, *Hebrew University of Jerusalem, Israel*

Contents: Introduction; Graphs; Metrics; Uniqueness: Graph determines space; Isolated fixed points implies toric variety; Blowing-up;

Completing the classification; our spaces are Kähler; Appendices; References.

Memoirs of the American Mathematical Society, Volume 141, Number 672

August 1999, 71 pages, Softcover, ISBN 0-8218-1181-9, LC 99-29338, 1991 *Mathematics Subject Classification*: 58F05, 70H33; 53C12, 53C55, **Individual member \$23**, List \$39, Institutional member \$31, Order code MEMO/141/672N



Diffeomorphisms and Noncommutative Analytic Torsion

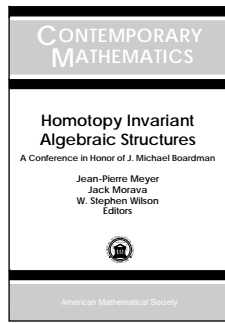
John Lott, *University of Michigan, Ann Arbor*

Contents: Introduction; Noncommutative bundle theory; Groups and covering spaces; \mathfrak{B} -Hermitian metrics and characteristic classes; Noncommutative superconnections; Fiber bundles; Diffeomorphism groups;

References.

Memoirs of the American Mathematical Society, Volume 141, Number 673

August 1999, 56 pages, Softcover, ISBN 0-8218-1189-4, LC 99-27217, 1991 *Mathematics Subject Classification*: 58G10, 58G11, **Individual member \$22**, List \$37, Institutional member \$30, Order code MEMO/141/673N



Homotopy Invariant Algebraic Structures

A Conference in Honor of J. Michael Boardman

Jean-Pierre Meyer, Jack Morava, and W. Stephen Wilson, *Johns Hopkins University, Baltimore, MD*, Editors

This volume presents the proceedings of the conference held in honor of J. Michael Boardman's 60th birthday. It brings into print his classic work on conditionally convergent spectral sequences.

Over the past 30 years, it has become evident that some of the deepest questions in algebra are best understood against the background of homotopy theory. Boardman and Vogt's theory of homotopy-theoretic algebraic structures and the theory of spectra, for example, were two benchmark breakthroughs underlying the development of algebraic K -theory and the recent advances in the theory of motives.

The volume begins with short notes by Mac Lane, May, Stasheff, and others on the early and recent history of the subject. But the bulk of the volume consists of research papers on topics that have been strongly influenced by Boardman's work. Articles give readers a vivid sense of the current state of the theory of "homotopy-invariant algebraic structures". Also included are two major foundational papers by Goerss and Strickland on applications of methods of algebra (i.e., Dieudonné modules and formal schemes) to problems of topology.

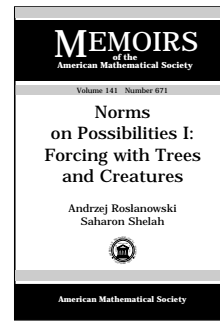
Boardman is known for the depth and wit of his ideas. This volume is intended to reflect and to celebrate those fine characteristics.

Contents: *Some history:* R. Thom, Note; S. Mac Lane, Higher homotopies, pacts, and the bar construction; J. P. May, The hare and the tortoise; J. Morava, Cobordism of involutions revisited, revisited; J. Stasheff, Grafting Boardman's cherry trees to quantum field theory; R. M. Vogt, My time as Mike Boardman's student and our work on infinite loop spaces; *Research papers:* T. P. Bisson, D. J. Pengelley, and F. Williams, Stabilizing the lower operations for mod two cohomology; J. M. Boardman, Conditionally convergent spectral sequences; A. K. Bousfield, On $K(n)$ -equivalences of spaces; S. L. Devadoss, Tessellations of moduli spaces and the mosaic operad; P. G. Goerss, Hopf rings, Dieudonné modules, and $E_*\Omega^2S^3$; M. Hovey and J. H. Palmieri, The structure of the Bousfield lattice; P. Hu, Transfinite spectral sequences; I. Kriz, The \mathbb{Z}/p -equivariant complex cobordism ring; K. Morisugi, Hopf constructions, Samelson products, and suspension maps; D. Randall, Embedding homotopy spheres and the Kervaire invariant; R. Schwänzl, R. M. Vogt, and F. Waldhausen, Adjoining roots of unity to E_∞ ring spectra in good cases—A remark; B. Steer and A. Wren, Grothendieck topology and the Picard group of a complex orbifold; N. P. Strickland, Formal schemes and formal groups; J. M. Turner, Simplicial commutative F_p -algebras through the looking-glass of F_p -local spaces; A. A. Voronov, The Swiss-cheese operad; W. S. Wilson, $K(n+1)$ equivalence implies $K(n)$ equivalence.

Contemporary Mathematics

September 1999, 376 pages, Softcover, ISBN 0-8218-1057-X, 1991 *Mathematics Subject Classification:* 55-03, 55Nxx, 55Pxx, 55Qxx, 55Txx, **Individual member \$46**, List \$76, Institutional member \$61, Order code CONM-MORAVAN

Logic and Foundations



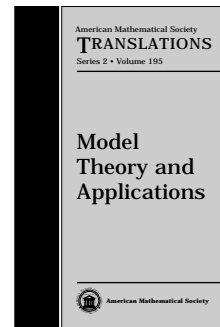
Norms on Possibilities I: Forcing with Trees and Creatures

Andrzej Roslanowski, *Boise State University, ID*, and Saharon Shelah, *Hebrew University of Jerusalem, Israel*

Contents: Introduction; Basic definitions; Preperness and the reading of names; More properties; Omittory with Halving; Around not adding Cohen reals; Playing with ultrafilters; Friends and relatives of PP; List of definitions; Bibliography.

Memoirs of the American Mathematical Society, Volume 141, Number 671

August 1999, 167 pages, Softcover, ISBN 0-8218-1180-0, LC 99-27220, 1991 *Mathematics Subject Classification:* 03E35; 03E40, 03E05, **Individual member \$29**, List \$48, Institutional member \$38, Order code MEMO/141/671N



Model Theory and Applications

This volume is a collection of papers on model theory and its applications. The longest paper, "Model Theory of Unitriangular Groups" by O. V. Belevgradek, forms a subtle general theory behind Mal'tsev's famous correspondence between rings and groups. This is the first published paper on the topic. Given the present model-theoretic interest in algebraic groups,

Belevgradek's work is of particular interest to logicians and algebraists.

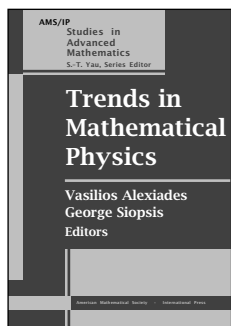
The rest of the collection consists of papers on various questions of model theory, mainly on stability theory. Contributors are leading Russian researchers in the field.

Contents: O. V. Belevgradek, Model theory of unitriangular groups; O. V. Belevgradek, Model theory of locally free algebras; A. A. Voronkov, Model theory based on the notion of truth in the constructive sense; B. I. Zil'ber, Hereditarily transitive groups and quasi-Urbanik structures; K. Zh. Kudaibergenov, The number of homogeneous models of a complete theory; T. G. Mustafin, The stability theory of polygons; E. A. Palyutin and S. S. Starchenko, Horn theories with nonmaximal spectrum; A. N. Ryaskin, The number of models of complete theories of unars; M. G. Peretyat'kin, Finitely axiomatizable theories and similarity relations.

American Mathematical Society Translations—Series 2, Volume 195

October 1999, approximately 360 pages, Hardcover, ISBN 0-8218-1092-8, 1991 *Mathematics Subject Classification:* 03-06, 03Cxx, 00B50, **Individual member \$53**, List \$89, Institutional member \$71, Order code TRANS2/195N

Mathematical Physics



Trends in Mathematical Physics

Vasilios Alexiades and George Siopsis, *University of Tennessee, Knoxville*, Editors

This volume presents the proceedings of the conference on "Trends in Mathematical Physics" held at the University of Tennessee. The conference drew international experts from

mathematical and computational physics. The following topics were addressed: superstrings and quantum gravity, pattern formation, and crystallographic topology. The cutting-edge research reflected in the extensive surveys in the book are written for a diverse audience.

Titles in this series are co-published with International Press, Cambridge, MA.

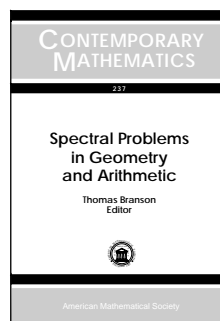
Contents: **R. R. Aldinger**, Berry's connection in a quantum relativistic description of the curved space analogue of development; **I. G. Avramidi** and **G. Esposito**, Heat-kernel asymptotics of the Gilkey-Smith boundary-value problem; **I. G. Avramidi** and **G. Esposito**, On ellipticity and gauge invariance in Euclidean quantum gravity; **A. L. Bertozzi**, **A. Münch**, and **M. Shearer**, Undercompressive waves in driven thin film flow: Theory, computation, and experiment; **A. V. Bogdanov**, **A. S. Gevorkyan**, and **A. G. Grigoryan**, Internal time peculiarities as a cause of bifurcations arising in classical trajectory problem and quantum chaos creation in three-body systems; **A. V. Bogdanov**, **A. S. Gevorkyan**, and **A. G. Grigoryan**, Random motion of quantum harmonic oscillator-Thermodynamics of nonrelativistic vacuum; **A. J. Bordner**, A new formulation of Lax pairs for generalized Calogero-Moser models; **G. Chalmers** and **K. Schalm**, Four-point correlation functions in the AdS/CFT correspondence; **S. A. Cherkis**, Gravitational instantons and moduli spaces; **E. Cremmer**, **B. Julia**, **H. Lü**, and **C. N. Pope**, Superdualities and twisted self-duality; **I. Dasgupta**, Boomerons in field theory; **M. J. Duff**, A layman's guide to M -theory; **J. K. Elwood**, Family symmetry, the anomalous $U(1)$, and neutrino mixing; **D. Ennyu**, **H. Kawabe**, and **N. Nakazawa**, Stochastic quantization approach to $c \leq 1$ open-closed string field theories; **C. D. Fosco**, Gauge invariance and effective actions at finite temperature; **I. Giannakis**, Superconformal deformations and space-time symmetries; **M. E. Glicksman**, Nonlinear patterns in microstructures; **C. R. Hagen**, Non-thermalizability of a quantum field theory; **R. A. Hefferlin**, Field theory for chemical spaces; **J. Hoppe**, From functions to matrices; **E. Horozov** and **A. Kasman**, Duality and construction of quantum integrable systems; **G. Huisken**, Geometric concepts for the mass in general relativity; **C. K. Johnson**, Crystallographic topology 2: Overview and work in progress; **I. I. Kogan** and **O. A. Soloviev**, Gravitationally dressed RG flows, zigzag symmetry and zero-tension strings; **C. LeBrun**, Einstein metrics and the Yamabe problem; **R. López-Alemán**, Numerical evolution in time of curvature perturbations in Kerr black holes; **A. Ludu** and **J. P. Draayer**, Nonlinearity and self-similarity: Wavelets and compactons on a physical background; **B. A. Magradze**, On analytic approach to perturbative quantum chromodynamics; **C. Michael**, Lattice gauge theory; **R. I. Nepomechie**, Integrable models with boundary; **H. Neuberger**, Mathematical aspects of chiral gauge

theories on the lattice; **L. A. Pando Zayas**, The statistical entropy of black holes and the AdS_3 geometry; **E. M. Rabei**, Canonical treatment of regular Lagrangians with holonomic constraints as singular systems; **C. Rasinariu**, **U. P. Sukhatme**, and **A. Gangopadhyaya**, Algebraic shape invariant models; **W. Rivera-Gallego**, Molecular configurations and Euclidean distance matrices; **I. A. Shovkovy**, Derivative expansion of the one-loop effective action in QED; **C. H. Taubes**, Nonlinear generalizations of a 3-manifold's Dirac operator; **C.-L. Wu**, Dynamical symmetry approach to quantum many-body problems; Contributors.

AMS/IP Studies in Advanced Mathematics, Volume 13

August 1999, 528 pages, Softcover, ISBN 0-8218-2006-0, LC 99-30848, 1991 *Mathematics Subject Classification*: 81-06, 83-06, All AMS members \$52, List \$65, Order code AMSIP/13N

Number Theory



Spectral Problems in Geometry and Arithmetic

Thomas Branson, *University of Iowa, Iowa City*, Editor

These are the proceedings of the NSF-CBMS Conference on "Spectral Problems in Geometry and Arithmetic" held at the University of Iowa. The principal speaker was Peter Sarnak, who has been a central contributor to

developments in this field. The volume approaches the topic from the geometric, physical, and number theoretic points of view. The remarkable new connections among seemingly disparate mathematical and scientific disciplines have surprised even veterans of the physical mathematics renaissance forged by gauge theory in the 1970s.

Numerical experiments show that the local spacing between zeros of the Riemann zeta function is modelled by spectral phenomena: the eigenvalue distributions of random matrix theory, in particular the Gaussian unitary ensemble (GUE). Related phenomena are from the point of view of differential geometry and global harmonic analysis. Elliptic operators on manifolds have (through zeta function regularization) functional determinants, which are related to functional integrals in quantum theory. The search for critical points of this determinant brings about extremely subtle and delicate sharp inequalities of exponential type. This indicates that zeta functions are spectral objects—and even physical objects. This volume demonstrates that zeta functions are also dynamic, chaotic, and more.

This item will also be of interest to those working in analysis.

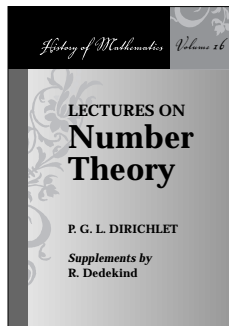
Contents: **E. L. Basor**, Connections between random matrices and Szegő limit theorems; **S.-Y. A. Chang** and **P. C. Yang**, On a fourth order curvature invariant; **R. Gornet** and **J. McGowan**, Small eigenvalues of the Hodge Laplacian for three-manifolds with pinched negative curvature; **C. M. Judge**, Heating and stretching Riemannian manifolds; **J. C. Lagarias**, Number theory zeta functions and dynamical zeta functions; **M. L. Lapidus** and **M. van Frankenhuysen**, Complex dimensions of fractal strings and oscillatory phenomena in fractal geometry and arithmetic; **K. Okikiolu**, High frequency cut-offs, trace formulas and geometry; **P. Perry**, Meromorphic continua-

tion of the resolvent for Kleinian groups; **Y. N. Petridis**, Variation of scattering poles for conformal metrics; **R. Rumely**, On Bilu's equidistribution theorem; **C. A. Tracy** and **H. Widom**, Asymptotics of a class of Fredholm determinants.

Contemporary Mathematics, Volume 237

August 1999, 174 pages, Softcover, ISBN 0-8218-0940-7, LC 99-29632, 1991 *Mathematics Subject Classification*: 11F72, 11M36, 35P20, 53A30, 58C40, **Individual member \$22**, List \$37, Institutional member \$30, Order code CONM/237N

A Classic



Lectures on Number Theory

P. G. L. Dirichlet with supplements by **R. Dedekind**

This volume is a translation of Dirichlet's *Vorlesungen über Zahlentheorie* which includes nine supplements by Dedekind and an introduction by John Stillwell, who translated the volume.

Lectures on Number Theory is the first of its kind on the subject matter. It covers most of the topics that are standard in a modern first course on number theory, but also includes Dirichlet's famous results on class numbers and primes in arithmetic progressions.

The book is suitable as a textbook, yet it also offers a fascinating historical perspective that links Gauss with modern number theory. The legendary story is told how Dirichlet kept a copy of Gauss's *Disquisitiones Arithmeticae* with him at all times and how Dirichlet strove to clarify and simplify Gauss's results. Dedekind's footnotes document what material Dirichlet took from Gauss, allowing insight into how Dirichlet transformed the ideas into essentially modern form.

Also shown is how Gauss built on a long tradition in number theory—going back to Diophantus—and how it set the agenda for Dirichlet's work. This important book combines historical perspective with transcendent mathematical insight. The material is still fresh and presented in a very readable fashion.

This book is the first in an informal sequence of works to be included within the AMS's *History of Mathematics* series. Volumes to be published within this subset are classical mathematical works that served as cornerstones for modern mathematical thought. (For another historical translation by Professor Stillwell, see *Sources of Hyperbolic Geometry* in the *History of Mathematics* series published by the AMS.)

Co-published with the London Mathematical Society. Members of the LMS may order directly from the AMS at the AMS member price. The LMS is registered with the Charity Commissioners.

Contents: On the divisibility of numbers; On the congruence of numbers; On quadratic residues; On quadratic forms; Determination of the class number of binary quadratic forms; Some theorems from Gauss's theory of circle division; On the limiting value of an infinite series; A geometric theorem; Genera of quadratic forms; Power residues for composite moduli; Primes in arithmetic progressions; Some theorems from the theory of circle division; On the Pell equation; Convergence and continuity of some infinite series; Index.

History of Mathematics

September 1999, 275 pages, Softcover, ISBN 0-8218-2017-6, 1991 *Mathematics Subject Classification*: 11-03, **All AMS members \$39**, List \$49, Order code HMATH-STILLWELL2N

Previously Announced Publications

Supplementary Reading

Geometric Models for Noncommutative Algebras

Ana Cannas da Silva and **Alan Weinstein**, *University of California, Berkeley*

The volume is based on a course, "Geometric Models for Noncommutative Algebras" taught by Professor Weinstein at Berkeley. Noncommutative geometry is the study of noncommutative algebras *as if* they were algebras of functions on spaces, for example, the commutative algebras associated to affine algebraic varieties, differentiable manifolds, topological spaces, and measure spaces. In this work, the authors discuss several types of geometric objects (in the usual sense of sets with structure) that are closely related to noncommutative algebras.

Central to the discussion are symplectic and Poisson manifolds, which arise when noncommutative algebras are obtained by deforming commutative algebras. The authors also give a detailed study of groupoids (whose role in noncommutative geometry has been stressed by Connes) as well as of Lie algebroids, the infinitesimal approximations to differentiable groupoids.

Featured are many interesting examples, applications, and exercises. The book starts with basic definitions and builds to (still) open questions. It is suitable for use as a graduate text. An extensive bibliography and index are included.

Berkeley Mathematical Lecture Notes, Volume 10

September 1999, 184 pages, Softcover, ISBN 0-8218-0952-0, 1991 *Mathematics Subject Classification*: 53F05, 58H05; 16S80, 17B35, 46L89, **All AMS members \$16**, List \$20, Order code BMLN/10RT98

The Classification of the Finite Simple Groups, Number 4

Part II, Chapters 1–4: Uniqueness Theorems

Daniel Gorenstein †, **Richard Lyons**, *Rutgers University, New Brunswick, NJ*, and **Ronald Solomon**, *Ohio State University, Columbus*

After three introductory volumes on the classification of the finite simple groups, (*Mathematical Surveys and Monographs*, Volumes 40.1, 40.2, and 40.3), the authors now start the proof of the classification theorem: They begin the analysis of a minimal counterexample G to the theorem.

Two fundamental and powerful theorems in finite group theory are examined: the Bender-Suzuki theorem on strongly embedded subgroups (for which the non-character-theoretic part of the proof is provided) and Aschbacher's Component theorem. Included are new generalizations of Aschbacher's theorem which treat components of centralizers of involutions and p -components of centralizers of elements of order p for arbitrary primes p .

This book, with background from sections of the previous volumes, presents in an approachable manner critical aspects of the classification of finite simple groups.

Features:

- Treatment of two fundamental and powerful theorems in finite group theory.
- Proofs that are accessible and largely self-contained.
- New results generalizing Aschbacher's Component theorem and related component uniqueness theorems.

Mathematical Surveys and Monographs, Volume 40

April 1999, 341 pages, Hardcover, ISBN 0-8218-1379-X, LC 94-23001, 1991 *Mathematics Subject Classification*: 20D05; 20B20, **Individual member \$45**, List \$75, Institutional member \$60, Order code SURV/40.4RT98

Independent Study

A Survey of the Hodge Conjecture Second Edition

James D. Lewis, *University of Alberta, Edmonton, Canada*

This book provides an introduction to a topic of central interest in transcendental algebraic geometry: the Hodge conjecture. Consisting of 15 lectures plus addenda and appendices, the volume is based on a series of lectures delivered by Professor Lewis at the Centre de Recherches Mathématiques (CRM).

The book is a self-contained presentation, completely devoted to the Hodge conjecture and related topics. It includes many examples, and most results are completely proven or sketched. The motivation behind many of the results and background material is provided. This comprehensive approach to the book gives it a "user-friendly" style. Readers need not search elsewhere for various results. The book is suitable for use as a text for a topics course in algebraic geometry; includes an appendix by B. Brent Gordon.

CRM Monograph Series, Volume 10

April 1999, 368 pages, Hardcover, ISBN 0-8218-0568-1, LC 99-13391, 1991 *Mathematics Subject Classification*: 14C30, **Individual member \$47**, List \$79, Institutional member \$63, Order code CRMM/10RT98

Characters of Connected Lie Groups

Lajos Pukanszky †

This book adds to the great body of research that extends back to A. Weil and E. P. Wigner on the unitary representations of locally compact groups and their characters, i.e. the interplay between classical group theory and modern analysis. The groups studied here are the connected Lie groups of general type (not necessarily nilpotent or semisimple).

Final results reflect Kirillov's orbit method; in the case of groups that may be non-algebraic or non-type I, the method requires considerable sophistication. Methods used range from deep functional analysis (the theory of C^* -algebras, factors from F. J. Murray and J. von Neumann, and measure theory) to differential geometry (Lie groups and Hamiltonian actions).

This book presents for the first time a systematic and concise compilation of proofs previously dispersed throughout the literature. The result is an impressive example of the deepness of Pukanszky's work.

Mathematical Surveys and Monographs

September 1999, approximately 152 pages, Hardcover, ISBN 0-8218-1088-X, LC 99-29967, 1991 *Mathematics Subject Classification*: 22E45, **Individual member \$35**, List \$59, Institutional member \$47, Order code SURV-PUKANSZKYRT98

Recommended Text

Algebraic Geometry 1 From Algebraic Varieties to Schemes

Kenji Ueno, *Kyoto University, Japan*

This is the first of three volumes on algebraic geometry.

Early in the 20th century, algebraic geometry underwent a significant overhaul, as mathematicians, notably Zariski, introduced a much stronger emphasis on algebra and rigor into the subject. This was followed by another fundamental change in the 1960s with Grothendieck's introduction of schemes. Today, most algebraic geometers are well-versed in the language of schemes, but many newcomers are still initially hesitant about them. Ueno's book provides an inviting introduction to the theory, which should overcome any such impediment to learning this rich subject.

The book begins with a description of the standard theory of algebraic varieties. Then, sheaves are introduced and studied, using as few prerequisites as possible. Once sheaf theory has been well understood, the next step is to see that an affine scheme can be defined in terms of a sheaf over the prime spectrum of a ring. By studying algebraic varieties over a field, Ueno demonstrates how the notion of schemes is necessary in algebraic geometry.

This first volume gives a definition of schemes and describes some of their elementary properties. It is then possible, with only a little additional work, to discover their usefulness. Further properties of schemes will be discussed in the second volume.

Ueno's book is a self-contained introduction to this important circle of ideas, assuming only a knowledge of basic notions from abstract algebra (such as prime ideals). It is suitable as a text for an introductory course on algebraic geometry.

Translations of Mathematical Monographs (*Iwanami Series in Modern Mathematics*), Volume 185

October 1999, approximately 168 pages, Softcover, ISBN 0-8218-0862-1, LC 99-22304, 1991 *Mathematics Subject Classification*: 14-01, **All AMS members \$20**, List \$25, Order code MMONO/185RT98

A Classic

Invariant Measures

John von Neumann

In 1940–1941 von Neumann lectured on invariant measures at the Institute for Advanced Study at Princeton. This book is essentially a written version of those lectures.

The lectures began with general measure theory and went on to Haar measure and some of its generalizations. Shizuo Kakutani was at the Institute that year, and he and von Neumann had many conversations on the subject. The conversations revealed facts and produced proofs. Quite a bit of the content of the course, especially toward the end, was discovered a few weeks before it appeared on the blackboard. The original version of these notes was prepared by Paul Halmos, von Neumann's assistant that year. Von Neumann read the handwritten version before it went to the typist and sometimes scribbled comments on the margins; he rewrote most of Chapter 6. This book is the first published version of the original notes.

August 1999, 134 pages, Softcover, ISBN 0-8218-0912-1, LC 98-15971, 1991 *Mathematics Subject Classification*: 28Axx, 22A10, **All AMS members \$31**, List \$39, Order code INMEASRT98