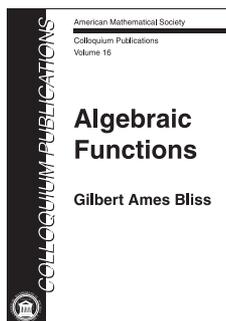


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Algebra and Algebraic Geometry



Algebraic Functions Gilbert Ames Bliss

This book, immediately striking for its conciseness, is one of the most remarkable works ever produced on the subject of algebraic functions and their integrals. The distinguishing feature of the book is its third chapter, on rational functions, which gives an extremely brief and clear account of the theory of divisors....

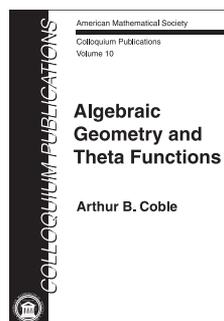
A very readable account is given of the topology of Riemann surfaces and of the general properties of abelian integrals. Abel's theorem is presented, with some simple applications. The inversion problem is studied for the cases of genus zero and genus unity. The chapter on the reduction of singularities is very noteworthy.... A final chapter illustrates the general theory with some examples. In particular, constructive methods are given for treating algebraic relations which are of the third degree in one of the variables.... The arithmetic theory of algebraic functions is a good thing. In making its study easy, Bliss has performed a service which will win him the gratitude of an ever increasing number of readers.

—*Bulletin of the American Mathematical Society*

Contents: Single-valued analytic functions; Algebraic functions and their expansions; Rational functions; The Riemann surface of an algebraic function; Integrals of rational functions; Abel's theorem; Birational transformations; The reduction of singularities by transformation; Inversion of Abelian integrals; Examples; List of references.

Colloquium Publications, Volume 16

December 1933, 218 pages, Softcover, ISBN: 978-0-8218-4607-0, LC 34-5791, 2000 *Mathematics Subject Classification*: 14-02, **AMS members US\$40**, List US\$50, Order code COLL/16



Algebraic Geometry and Theta Functions

Arthur B. Coble

This volume is an amplification of the Colloquium Lectures delivered under the title *The Determination of the Tritangent Planes of the Space Sextic of Genus Four*. In order to present clearly the state of that problem, a comparison with the better known cases of genus two and genus three is desirable. Preliminary chapters on

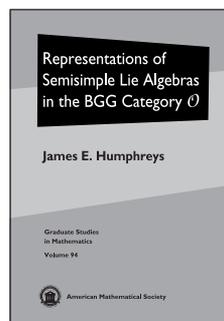
algebraic geometry and theta functions are incorporated in order to facilitate reading by recalling fundamental ideas of these two subjects in such fashion as will be most helpful in later applications.

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

Contents: Topics in algebraic geometry; Topics in theta functions; Geometric applications of the functions of genus two; Geometric applications of the functions of genus three; Geometric aspects of the abelian modular functions of genus four; Theta relations of genus four; References.

Colloquium Publications, Volume 10

December 1929, 282 pages, Softcover, ISBN: 978-0-8218-4602-5, LC 30-12679, 2000 *Mathematics Subject Classification*: 14-XX, **AMS members US\$46**, List US\$58, Order code COLL/10



Representations of Semisimple Lie Algebras in the BGG Category \mathcal{O}

James E. Humphreys, *University of Massachusetts, Amherst, MA*

This is the first textbook treatment of work leading to the landmark 1979 Kazhdan-Lusztig Conjecture on characters of simple highest weight modules for a semisimple Lie algebra \mathfrak{g} over \mathbb{C} . The setting is the module category \mathcal{O} introduced by Bernstein-Gelfand-Gelfand, which includes all highest weight

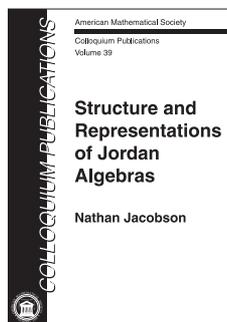
modules for \mathfrak{g} such as Verma modules and finite dimensional simple modules. Analogues of this category have become influential in many areas of representation theory.

Part I can be used as a text for independent study or for a mid-level one semester graduate course; it includes exercises and examples. The main prerequisite is familiarity with the structure theory of \mathfrak{g} . Basic techniques in category \mathcal{O} such as BGG Reciprocity and Jantzen's translation functors are developed, culminating in an overview of the proof of the Kazhdan-Lusztig Conjecture (due to Beilinson-Bernstein and Brylinski-Kashiwara). The full proof however is beyond the scope of this book, requiring deep geometric methods: D -modules and perverse sheaves on the flag variety. Part II introduces closely related topics important in current research: parabolic category \mathcal{O} , projective functors, tilting modules, twisting and completion functors, and Koszul duality theorem of Beilinson-Ginzburg-Soergel.

Contents: Review of semisimple Lie algebras; *Highest weight modules:* Category \mathcal{O} : Basics; Characters of finite dimensional modules; Category \mathcal{O} : Methods; Highest weight modules I; Highest weight modules II; Extensions and resolutions; Translation functors; Kazhdan-Lusztig theory; *Further developments:* Parabolic versions of category \mathcal{O} ; Projective functors and principal series; Tilting modules; Twisting and completion functors; Complements; Bibliography; Frequently used symbols; Index.

Graduate Studies in Mathematics, Volume 94

August 2008, 289 pages, Hardcover, ISBN: 978-0-8218-4678-0, LC 2008012667, 2000 *Mathematics Subject Classification:* 17B10; 20G05, 22E47, **AMS members US\$47**, List US\$59, Order code GSM/94



Structure and Representations of Jordan Algebras

Nathan Jacobson

The theory of Jordan algebras has played important roles behind the scenes of several areas of mathematics. Jacobson's book has long been the definitive treatment of the subject. It covers foundational material, structure theory,

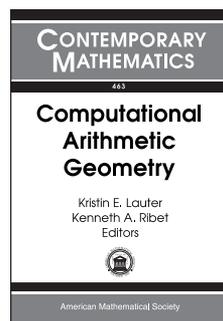
and representation theory for Jordan algebras. Of course, there are immediate connections with Lie algebras, which Jacobson details in Chapter 8. Of particular continuing interest is the discussion of exceptional Jordan algebras, which serve to explain the exceptional Lie algebras and Lie groups.

Jordan algebras originally arose in the attempts by Jordan, von Neumann, and Wigner to formulate the foundations of quantum mechanics. They are still useful and important in modern mathematical physics, as well as in Lie theory, geometry, and certain areas of analysis.

Contents: Foundations; Elements of representation theory; Peirce decompositions and Jordan matrix algebras; Jordan algebras with minimum conditions on quadratic ideals; Structure theory for finite-dimensional Jordan algebras; Generic minimum polynomials, traces and norms; Representation theory for separable Jordan algebras; Connections with Lie algebras; Exceptional Jordan algebras; Further results and open questions; Bibliography; Subject index.

Colloquium Publications, Volume 39

December 1968, 453 pages, Softcover, ISBN: 978-0-8218-4640-7, LC 68-19439, 2000 *Mathematics Subject Classification:* 17-XX, 16-02, **AMS members US\$66**, List US\$82, Order code COLL/39.S



Computational Arithmetic Geometry

Kristin E. Lauter, *Microsoft Research, Redmond, WA*, and Kenneth A. Ribet, *University of California at Berkeley, CA*, Editors

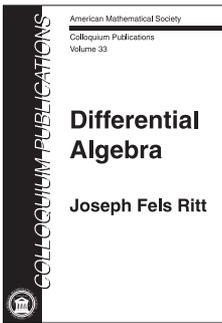
With the recent increase in available computing power, new computations are possible in many areas of arithmetic geometry. To name just a few examples, Cremona's tables of elliptic curves now go up to conductor 120,000 instead of just conductor 1,000, tables of Hilbert class fields are known for discriminant up to at least 5,000, and special values of Hilbert and Siegel modular forms can be calculated to extremely high precision. In many cases, these experimental capabilities have led to new observations and ideas for progress in the field. They have also led to natural algorithmic questions on the feasibility and efficiency of many computations, especially for the purpose of applications in cryptography. The AMS Special Session on Computational Arithmetic Geometry, held on April 29-30, 2006, in San Francisco, CA, gathered together many of the people currently working on the computational and algorithmic aspects of arithmetic geometry. This volume contains research articles related to talks given at the session. The majority of articles are devoted to various aspects of arithmetic geometry, mainly with a computational approach.

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

Contents: J. D. Achter, Results of Cohen-Lenstra type for quadratic function fields; E. Bach and D. Charles, The hardness of computing an eigenform; R. Bröker and P. Stevenhagen, Constructing elliptic curves of prime order; A. Deajim and D. Grant, Space-time codes and non-associative division algebras arising from elliptic curves; J. S. Ellenberg, Points of low height on \mathbb{P}^1 over number fields and bounds for torsion in class groups; E. W. Howe, Supersingular genus-2 curves over fields of characteristic 3; K. S. Kedlaya, Search techniques for root-unitary polynomials; B. Levitt and W. McCallum, Yet more elements in the Shafarevich-Tate group of the Jacobian of a Fermat curve; K. McMurdy, Stable reduction of $X_0(81)$; B. Poonen, Isomorphism types of commutative algebras of finite rank over an algebraically closed field; R. Pries, A short guide to p -torsion of abelian varieties in characteristic p .

Contemporary Mathematics, Volume 463

August 2008, 129 pages, Softcover, ISBN: 978-0-8218-4320-8, LC 2008010326, 2000 *Mathematics Subject Classification:* 14G05, 14G10, 14G15, 14G50, 14H45, 11G50, 11G15, 11G20, 11Y16, 11F11, **AMS members US\$39**, List US\$49, Order code CONM/463



Differential Algebra

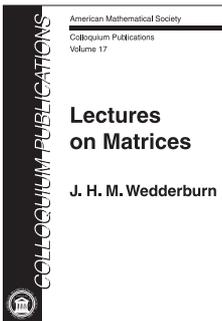
Joseph Fels Ritt

A gigantic task undertaken by J. F. Ritt and his collaborators in the 1930's was to give the classical theory of nonlinear differential equations, similar to the theory created by Emmy Noether and her school for algebraic equations and algebraic varieties. The current book presents the results of 20 years of work on this problem. The book quickly became a classic, and thus far, it remains one of the most complete and valuable accounts of differential algebra and its applications.

Contents: Differential polynomials and their ideals; Algebraic differential manifolds; Structure of differential polynomials; Systems of algebraic equations; Constructive methods; Analytical considerations; Intersections of algebraic differential manifolds; Riquier's existence theorem for orthonomic systems; Partial differential algebra; Questions for investigation; Bibliography; Index.

Colloquium Publications, Volume 33

December 1950, 184 pages, Softcover, ISBN: 978-0-8218-4638-4, LC 50-8228, **AMS members US\$33**, List US\$41, Order code COLL/33.S



Lectures on Matrices

J. H. M. Wedderburn

It is the organization and presentation of the material, however, which make the peculiar appeal of the book. This is no mere compendium of results—the subject has been completely reworked and the proofs recast with the skill and elegance which come only from years of devotion.

—*Bulletin of the American Mathematical Society*

The very clear and simple presentation gives the reader easy access to the more difficult parts of the theory.

—*Jahrbuch über die Fortschritte der Mathematik*

In 1937, the theory of matrices was seventy-five years old. However, many results had only recently evolved from special cases to true general theorems. With the publication of his Colloquium Lectures, Wedderburn provided one of the first great syntheses of the subject. Much of the material in the early chapters is now familiar from textbooks on linear algebra. Wedderburn discusses topics such as vectors, bases, adjoints, eigenvalues and the characteristic polynomials, up to and including the properties of Hermitian and orthogonal matrices. Later chapters bring in special results on commuting families of matrices, functions of matrices—including elements of the differential and integral calculus sometimes known as matrix analysis, and transformations of bilinear forms. The final chapter treats associative algebras, culminating with the well-known Wedderburn-Artin theorem that simple algebras are necessarily isomorphic to matrix algebras.

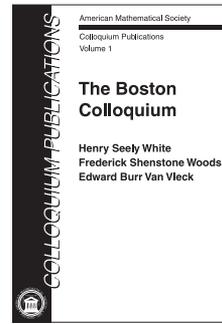
Wedderburn ends with an appendix of historical notes on the development of the theory of matrices, and a bibliography that emphasizes the history of the subject.

Contents: Matrices and vectors; Algebraic operations with matrices. The characteristic equation; Invariant factors and elementary

divisors; Vector polynomials. Singular matrix polynomials; Compound matrices; Symmetric, skew, and hermitian matrices; Commutative matrices; Functions of matrices; The automorphic transformation of a bilinear form; Linear associative algebras; Notes; Bibliography; Index to bibliography; Index.

Colloquium Publications, Volume 17

December 1934, 205 pages, Softcover, ISBN: 978-0-8218-4610-0, LC 35-4487, 2000 *Mathematics Subject Classification*: 15-02, **AMS members US\$36**, List US\$45, Order code COLL/17



The Boston Colloquium

Henry Seely White, Frederick Shenstone Woods, and Edward Burr Van Vleck

The 1903 colloquium of the American Mathematical Society was held as part of the summer meeting that took place in Boston. Three sets of lectures were presented: *Linear Systems of Curves on Algebraic Surfaces*, by H. S. White, *Forms of Non-Euclidean Space*, by F. S. Woods, and *Selected Topics in the Theory of Divergent Series and of Continued Fractions*, by Edward B. Van Vleck.

White's lectures are devoted to the theory of systems of curves on an algebraic surface, with particular reference to properties that are invariant under birational transformations and the kinds of surfaces that admit given systems.

Woods' lectures deal with the problem of the classification of three-dimensional Riemannian spaces of constant curvature. The author presents and discusses Riemann postulates characterizing manifolds of constant curvature, and explains in detail the results of Clifford, Klein, and Killing devoted to the local and global classification problems.

The subject of Van Vleck's lectures is the theory of divergent series. The author presents results of Poincaré, Stieltjes, E. Borel, and others about the foundations of this theory. In particular, he shows "how to determine the conditions under which a divergent series may be manipulated as the analytic representative of an unknown function, to develop the properties of the function, and to formulate methods of deriving a function uniquely from the series." In the concluding portion of these lectures, some results about continuous fractions of algebraic functions are presented.

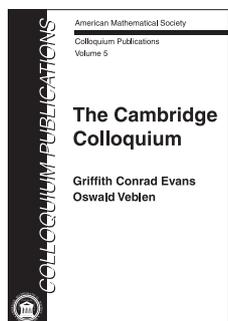
This item will also be of interest to those working in geometry and topology and analysis.

Contents: H. S. White, Linear systems of curves on algebraic surfaces; F. S. Woods, Forms of non-Euclidean space; E. B. Van Vleck, Selected topics in the theory of divergent series and of continued fractions; Bibliography.

Colloquium Publications, Volume 1

December 1905, 187 pages, Softcover, ISBN: 978-0-8218-4588-2, LC 5-19543, 2000 *Mathematics Subject Classification*: 00B15; 14Hxx, 53Axx, 40Axx, **AMS members US\$35**, List US\$44, Order code COLL/1

Analysis



The Cambridge Colloquium

Griffith Conrad Evans and Oswald Veblen

The 1916 colloquium of the American Mathematical Society was held as part of the summer meeting that took place in Boston. Two sets of lectures were presented: *Functionals and their Applications. Selected Topics, including*

Integral Equations, by G. C. Evans, and *Analysis Situs*, by Oswald Veblen.

The lectures by Evans are devoted to functionals and their applications. By a *functional* the author means a function on an infinite-dimensional space, usually a space of functions, or of curves on the plane or in 3-space, etc. The first lecture deals with general considerations of functionals (continuity, derivatives, variational equations, etc.). The main topic of the second lecture is the study of complex-valued functionals, such as integrals of complex functions in several variables. The third lecture is devoted to the study of what is called implicit functional equations. This study requires, in particular, the development of the notion of a Fréchet differential, which is also discussed in this lecture. The fourth lecture contains generalizations of the Bôcher approach to the treatment of the Laplace equation, where a harmonic function is characterized as a function with no flux (Evans' terminology) through every circle on the plane. Finally, the fifth lecture gives an account of various generalizations of the theory of integral equations.

Analysis situs is the name used by Poincaré when he was creating, at the end of the 19th century, the area of mathematics known today as topology. Veblen's lectures, forming the second part of the book, contain what is probably the first text where Poincaré's results and ideas were summarized, and an attempt to systematically present this difficult new area of mathematics was made.

This is how S. Lefschetz had described, in his 1924 review of the book, the experience of "a beginner attracted by the fascinating and difficult field of analysis situs":

"Difficult reasonings beset him at every step, an unfriendly notation did not help matters, to all of which must be added, most baffling of all, the breakdown of geometric intuition precisely when most needed. No royal road can be created through this dense forest, but a good and thoroughgoing treatment of fundamentals, notation, terminology, may smooth the path somewhat. And this and much more we find supplied by Veblen's Lectures."

Of the two streams of topology existing at that time, point set topology and combinatorial topology, it is the latter to which Veblen's book is almost totally devoted. The first four chapters present, in detail, the notion and properties (introduced by Poincaré) of the incidence matrix of a cell decomposition of a manifold. The main goal of the author is to show how to reproduce main topological invariants of a manifold and their relations in terms of the incidence matrix.

The (last) fifth chapter contains what Lefschetz called "an excellent summary of several important questions: homotopy and isotopy, theory of the indicatrix, a fairly ample treatment of the group of a

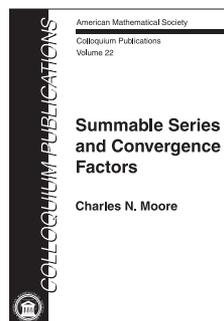
manifold, finally a bird's eye view of what is known and not known (mostly the latter) on three dimensional manifolds."

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

Contents: G. C. Evans, Functionals and their applications. Selected topics, including integral equations; O. Veblen, Analysis situs.

Colloquium Publications, Volume 5

December 1918, 306 pages, Softcover, ISBN: 978-0-8218-4642-1, LC 19-12273, 2000 *Mathematics Subject Classification*: 00B15; 45-XX, 55-XX, **AMS members US\$48**, List US\$60, Order code COLL/5



Summable Series and Convergence Factors

Charles N. Moore

Fairly early in the development of the theory of summability of divergent series, the concept of convergence factors was recognized as of fundamental importance in the subject. One of the pioneers in this field was C. N. Moore, the author of the book under review.... Moore classifies convergence factors into two types. In

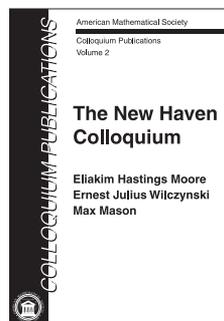
type I he places the factors which have only the property that they preserve convergence for a convergent series or produce convergence for a summable series. In type II he places the factors which not only maintain or produce convergence but have the additional property that they may be used to obtain the sum or generalized sum of the series. This book gives a generalized systematic treatment of the theory of convergence factors of both types, for simply infinite series and for multiple series, convergent and summable....

—*Bulletin of the American Mathematical Society*

Contents: Introduction; Convergence factors in convergent series; Summation of series by Nörlund means; Convergence factors in summable series; Convergence factors in summable double series; Convergence factors in summable multiple series; Convergence factors in restrictedly convergent multiple series; Bibliography; Index.

Colloquium Publications, Volume 22

December 1938, 105 pages, Softcover, ISBN: 978-0-8218-4620-9, LC 38-22994, 2000 *Mathematics Subject Classification*: 40-02, **AMS members US\$20**, List US\$25, Order code COLL/22



The New Haven Colloquium

Eliakim Hastings Moore, Ernest Julius Wilczynski, and Max Mason

The American Mathematical Society held its fifth colloquium in connection with its thirteenth summer meeting, under the auspices of Yale University, during the week September 3-8, 1906. This book

contains the lecture notes for the three courses that were given at this colloquium: "Introduction to a Form of General Analysis" by

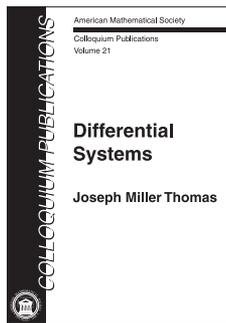
Eliakim H. Moore, "Projective Differential Geometry" by Ernest J. Wilczynski, and "Selected Topics in the Theory of Boundary Value Problems of Differential Equations" by Max Mason.

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

Contents: E. H. Moore, Introduction to a form of general analysis; E. J. Wilczyński, Projective differential geometry; M. Mason, Selected topics in the theory of boundary value problems of differential equations.

Colloquium Publications, Volume 2

December 1910, 222 pages, Softcover, ISBN: 978-0-8218-4591-2, LC 10-10798, 2000 *Mathematics Subject Classification:* 26-02, 53-02, 34-02, **AMS members US\$39**, List US\$49, Order code COLL/2



Differential Systems

Joseph Miller Thomas

The main goal of this book is to present the theory of systems of partial differential equations and the theory of Pfaffian systems so as to exhibit clearly the relations between them.

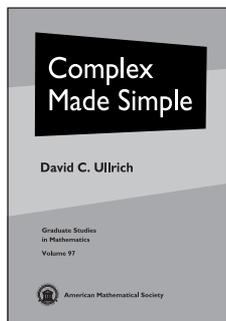
In presenting the theory of Pfaffian systems, the author develops, in detail, the theories of Grassmann algebras and rings with differentiation. In particular,

following Grassmann and É. Cartan, he introduces and freely uses what is now known as a ring of differential forms with functional coefficients. In presenting the theory of systems of partial differential equations, the author concentrates on the existence of solutions and methods of approximating them, rather than on their properties. The relations and similarities of two theories are displayed through the systematic use of various versions of the elimination method.

Contents: Introduction; Generalities on symbols and systems; Grassmann algebra; Differential rings; Commutative monomials and polynomials; Algebraic systems; Algebraic differential systems; Function systems and differential systems; Pfaffian systems; Consistency examples; Illustrative examples; Bibliography; Index.

Colloquium Publications, Volume 21

December 1937, 118 pages, Softcover, ISBN: 978-0-8218-4619-3, LC 37-11417, 2000 *Mathematics Subject Classification:* 57-02; 35A10, 58A17, **AMS members US\$22**, List US\$28, Order code COLL/21



Complex Made Simple

David C. Ullrich, *Oklahoma State University, Stillwater, OK*

Perhaps uniquely among mathematical topics, complex analysis presents the student with the opportunity to learn a thoroughly developed subject that is rich in both theory and applications. Even in an introductory course, the theorems and techniques can have elegant formulations. But for any of these profound results, the

student is often left asking: What does it really mean? Where does it come from?

In *Complex Made Simple*, David Ullrich shows the student how to think like an analyst. In many cases, results are discovered or derived, with an explanation of how the students might have found the theorem on their own. Ullrich explains why a proof works. He will also, sometimes, explain why a tempting idea *does not* work.

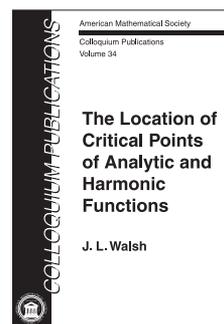
Complex Made Simple looks at the Dirichlet problem for harmonic functions twice: once using the Poisson integral for the unit disk and again in an informal section on Brownian motion, where the reader can understand intuitively how the Dirichlet problem works for general domains. Ullrich also takes considerable care to discuss the modular group, modular function, and covering maps, which become important ingredients in his modern treatment of the often-overlooked original proof of the Big Picard Theorem.

This book is suitable for a first-year course in complex analysis. The exposition is aimed directly at the students, with plenty of details included. The prerequisite is a good course in advanced calculus or undergraduate analysis.

Contents: *Part 1. Complex made simple:* Differentiability and Cauchy-Riemann equations; Power series; Preliminary results on holomorphic functions; Elementary results on holomorphic functions; Logarithms, winding numbers and Cauchy's theorem; Counting zeroes and the open mapping theorem; Euler's formula for $\sin(z)$; Inverses of holomorphic maps; Conformal mappings; Normal families and the Riemann mapping theorem; Harmonic functions; Simply connected open sets; Runge's theorem and the Mittag-Leffler theorem; The Weierstrass factorization theorem; Carathéodory's theorem; More on $\text{Aut}(\mathbb{D})$; Analytic continuation; Orientation; The modular function; Preliminaries for the Picard theorems; The Picard theorems; *Part 2. Further results:* Abel's theorem; More on Brownian motion; More on the maximum modulus theorem; The Gamma function; Universal covering spaces; Cauchy's theorem for non-holomorphic functions; Harmonic conjugates; *Part 3. Appendices:* Complex numbers; Complex numbers, continued; Sin, cos and exp; Metric spaces; Convexity; Four counterexamples; The Cauchy-Riemann equations revisited; References; Index of notations; Index.

Graduate Studies in Mathematics, Volume 97

September 2008, approximately 477 pages, Hardcover, ISBN: 978-0-8218-4479-3, LC 2008017911, 2000 *Mathematics Subject Classification:* 30-01, **AMS members US\$60**, List US\$75, Order code GSM/97



The Location of Critical Points of Analytic and Harmonic Functions

J. L. Walsh

This book is concerned with the critical points of analytic and harmonic functions. A critical point of an analytic function means a zero of its derivative, and a

critical point of a harmonic function means a point where both partial derivatives vanish. The analytic functions considered are largely polynomials, rational functions, and certain periodic, entire, and meromorphic functions. The harmonic functions considered are largely Green's functions, harmonic measures, and various linear combinations of them. The interest in these functions centers around the approximate location of their critical points. The approximation is in the sense of determining minimal regions in

which all the critical points lie or maximal regions in which no critical point lies. Throughout the book the author uses the single method of regarding the critical points as equilibrium points in fields of force due to suitable distribution of matter.

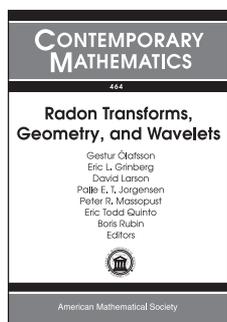
The exposition is clear, complete, and well-illustrated with many examples.

Contents: Fundamental results; Real polynomials; Polynomials, continued; Rational functions; Rational functions with symmetry; Analytic functions; Green's functions; Harmonic functions; Further harmonic functions; Bibliography; Index.

Colloquium Publications, Volume 34

December 1950, 384 pages, Softcover, ISBN: 978-0-8218-4643-8, LC 50-12177, 2000 *Mathematics Subject Classification*: 30-XX, **AMS members US\$58**, List US\$73, Order code COLL/34.S

Applications



Radon Transforms, Geometry, and Wavelets

Gestur Ólafsson, *Louisiana State University, Baton Rouge, LA*, **Eric L. Grinberg**, *University of New Hampshire, Durham, NH*, **David Larson**, *Texas A & M University, College Station, TX*, **Palle E. T. Jorgensen**, *University of Iowa,*

Iowa City, IA, **Peter R. Massopust**, *Institute of Biomathematics and Biometry, Neuherberg, Germany*, **Eric Todd Quinto**, *Tufts University, Medford, MA*, and **Boris Rubin**, *Louisiana State University, Baton Rouge, LA*, Editors

This volume is based on two special sessions held at the AMS Annual Meeting in New Orleans in January 2007, and a satellite workshop held in Baton Rouge on January 4–5, 2007. It consists of invited expositions that together represent a broad spectrum of fields, stressing surprising interactions and connections between areas that are normally thought of as disparate. The main topics are geometry and integral transforms. On the one side are harmonic analysis, symmetric spaces, representation theory (the groups include continuous and discrete, finite and infinite, compact and non-compact), operator theory, PDE, and mathematical probability. Moving in the applied direction we encounter wavelets, fractals, and engineering topics such as frames and signal and image processing.

The subjects covered in this book form a unified whole, and they stand at the crossroads of pure and applied mathematics. The articles cover a broad range in harmonic analysis, with the main themes related to integral geometry, the Radon transform, wavelets and frame theory. These themes can loosely be grouped together as follows:

- Frame Theory and Applications
- Harmonic Analysis and Function Spaces
- Harmonic Analysis and Number Theory
- Integral Geometry and Radon Transforms
- Multiresolution Analysis, Wavelets, and Applications

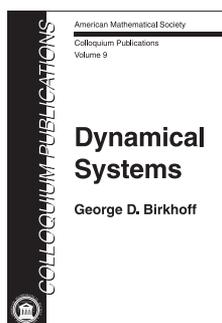
This item will also be of interest to those working in differential equations.

Contents: **I. A. Aliev**, **B. Rubin**, **S. Sezer**, and **S. B. Uyhan**, Composite wavelet transforms: Applications and perspectives; **J. J. Benedetto**, **O. Oktay**, and **A. Tangboondouangjit**, Complex sigma-delta quantization algorithms for finite frames; **B. Currey** and **T. McNamara**, Decomposition and admissibility for the quasiregular representation for generalized oscillator groups; **D. E. Dutkay** and **P. E. T. Jorgensen**, Fourier series on fractals: A parallel with wavelet theory; **D. V. Feldman**, A computational complexity paradigm for tomography; **F. B. Gonzalez**, Invariant differential operators on matrix motion groups and applications to the matrix radon transform; **D. Hart** and **A. Iosevich**, Sums and products in finite fields: An integral geometric viewpoint; **B. D. Johnson** and **K. A. Okoudjou**, Frame potential and finite abelian groups; **P. G. Casazza** and **G. Kutyniok**, Robustness of fusion frames under erasures of subspaces and of local frame vectors; **K. D. Merrill**, Smooth, well-localized Parseval wavelets based on wavelet sets in \mathbb{R}^2 ; **S. Jain**, **M. Papadakis**, and **E. Dussaud**, Explicit schemes in seismic migration and isotropic multiscale representations; **G. Ólafsson** and **B. Rubin**, Invariant functions on Grassmannians; **G. Ólafsson** and **S. Zheng**, Harmonic analysis related to Schrödinger operators; **I. Pesenson**, Discrete Helgason-Fourier transform for Sobolev and Besov functions on noncompact symmetric spaces; **E. T. Quinto**, Helgason's support theorem and spherical radon transforms.

Contemporary Mathematics, Volume 464

August 2008, 264 pages, Softcover, ISBN: 978-0-8218-4327-7, 2000 *Mathematics Subject Classification*: 42C40, 44A12; 43A85, 51M25, 52A22, 65T99, **AMS members US\$63**, List US\$79, Order code CONM/464

Differential Equations



Dynamical Systems

George D. Birkhoff

His research in dynamics constitutes the middle period of Birkhoff's scientific career, that of maturity and greatest power.

—*Yearbook of the American Philosophical Society*

The author's great book...is well known to all, and the diverse active modern

developments in mathematics which have been inspired by this volume bear the most eloquent testimony to its quality and influence.

—*Zentralblatt MATH*

In 1927, G. D. Birkhoff wrote a remarkable treatise on the theory of dynamical systems that would inspire many later mathematicians to do great work. To a large extent, Birkhoff was writing about his own work on the subject, which was itself strongly influenced by Poincaré's approach to dynamical systems. With this book, Birkhoff also demonstrated that the subject was a beautiful theory, much more than a compendium of individual results. The influence of this work can be found in many fields, including differential equations, mathematical physics, and even what is now known as Morse theory.

The present volume is the revised 1966 reprinting of the book, including a new addendum, some footnotes, references added by Jürgen Moser, and a special preface by Marston Morse.

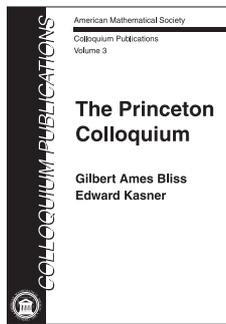
Although dynamical systems has thrived in the decades since Birkhoff's book was published, this treatise continues to offer insight and inspiration for still more generations of mathematicians.

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

Contents: Physical aspects of dynamical systems; Variational principles and applications; Formal aspects of dynamics; Stability of periodic motions; Existence of periodic motions; Application of Poincaré's geometric theorem; General theory of dynamical systems; The case of two degrees of freedom; The problem of three bodies; Addendum; Footnotes; Bibliography; Index.

Colloquium Publications, Volume 9

December 1927, 305 pages, Softcover, ISBN: 978-0-8218-1009-5, LC 28-28411, 2000 *Mathematics Subject Classification*: 34-XX, **AMS members US\$47**, List US\$59, Order code COLL/9



The Princeton Colloquium

Gilbert Ames Bliss and Edward Kasner

Following the early tradition of the American Mathematical Society, the sixth colloquium of the Society was held as part of the summer meeting that took place at Princeton University. Two sets of lectures were presented: *Fundamental Existence*

Theorems, by G. A. Bliss, and *Geometric Aspects of Dynamics*, by Edward Kasner.

The goal of Bliss's Colloquium Lectures is an overview of contemporary existence theorems for solutions to ordinary or partial differential equations. The first part of the book, however, covers algebraic and analytic aspects of implicit functions. These become the primary tools for the existence theorems, as Bliss builds from the theories established by Cauchy and Picard. There are also applications to the calculus of variations.

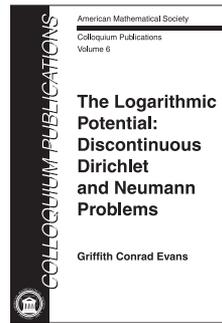
Kasner's lectures were concerned with the differential geometry of dynamics, especially kinetics. At the time of the colloquium, it was more common in kinematics to consider geometry of trajectories only in the absence of an external force. The lectures begin with a discussion of the possible trajectories in an arbitrary force field. Kasner then specializes to the study of conservative forces, including wave propagation and some curious optical phenomena. The discussion of constrained motions leads to the brachistochrone and tautochrone problems. Kasner concludes by looking at more complicated motions, such as trajectories in a resisting medium.

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

Contents: G. A. Bliss, Fundamental existence theorems; E. Kasner, Differential geometric aspects of dynamics.

Colloquium Publications, Volume 3

December 1913, 224 pages, Softcover, ISBN: 978-0-8218-4641-4, LC 14-3157, 2000 *Mathematics Subject Classification*: 34-02, 35-02, 37-02, 70-02, **AMS members US\$42**, List US\$52, Order code COLL/3



The Logarithmic Potential: Discontinuous Dirichlet and Neumann Problems

Griffith Conrad Evans

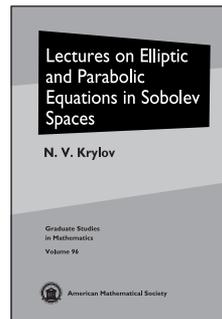
This book studies fundamental properties of the logarithmic potential and their connections to the theory of Fourier series,

to potential theory, and to function theory. The material centers around a study of Poisson's integral in two dimensions and of the corresponding Stieltjes integral. The results are then extended to the integrals in terms of Green's functions for general regions. There are some thirty exercises scattered throughout the text. These are designed in part to familiarize the reader with the concepts introduced, and in part to complement the theory. The reader should know something of potential theory, functions of a complex variable, and Lebesgue integrals. The book is based on lectures given by the author in 1924-1925 at the Rice Institute and at the University of Chicago.

Contents: Preliminary concepts. Stieltjes integrals and Fourier series; Functions harmonic within a circle; Necessary and sufficient conditions. The Dirichlet problems for the circle; Potentials of a single layer and the Neumann problem; General simply connected plane regions and the order of their boundary points; Plane regions of finite connectivity; Related problems; Index.

Colloquium Publications, Volume 6

December 1927, 150 pages, Softcover, ISBN: 978-0-8218-4599-8, LC 28-28410, 2000 *Mathematics Subject Classification*: 30-02, 31-02, **AMS members US\$28**, List US\$35, Order code COLL/6



Lectures on Elliptic and Parabolic Equations in Sobolev Spaces

N. V. Krylov, University of Minnesota, Minneapolis, MN

This book concentrates on the basic facts and ideas of the modern theory of linear elliptic and parabolic equations in Sobolev spaces.

The main areas covered in this book are the first boundary-value problem for elliptic equations and the Cauchy problem for parabolic equations. In addition, other boundary-value problems such as the Neumann or oblique derivative problems are briefly covered. As is natural for a textbook, the main emphasis is on organizing well-known ideas in a self-contained exposition. Among the topics included that are not usually covered in a textbook are a relatively recent development concerning equations with VMO coefficients and the study of parabolic equations with coefficients measurable only with respect to the time variable. There are numerous exercises which help the reader better understand the material.

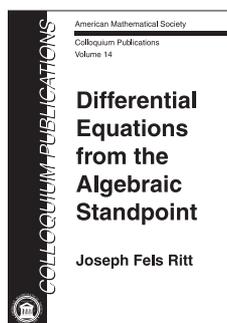
After going through the book, the reader will have a good understanding of results available in the modern theory of partial differential equations and the technique used to obtain them.

Prerequisites are basics of measure theory, the theory of L_p spaces, and the Fourier transform.

Contents: Second-order elliptic equations in $W_2^2(\mathbb{R}^d)$; Second-order parabolic equations in $W_2^{1,k}(\mathbb{R}^{d+1})$; Some tools from real analysis; Basic L_p -estimates for parabolic and elliptic equations; Parabolic and elliptic equations in $W_p^{1,k}$ and W_p^k ; Equations with VMO coefficients; Parabolic equations with VMO coefficients in spaces with mixed norms; Second-order elliptic equations in $W_p^2(\Omega)$; Second-order elliptic equations in $W_p^k(\Omega)$; Sobolev embedding theorems for $W_p^k(\Omega)$; Second-order elliptic equations $Lu - \lambda u = f$ with λ small; Fourier transform and elliptic operators; Elliptic operators and the spaces H_p^s ; Bibliography; Index.

Graduate Studies in Mathematics, Volume 96

September 2008, approximately 366 pages, Hardcover, ISBN: 978-0-8218-4684-1, LC 2008016051, 2000 *Mathematics Subject Classification*: 35-01; 35J15, 35K10, **AMS members US\$52**, List US\$65, Order code GSM/96



Differential Equations from the Algebraic Standpoint

Joseph Fels Ritt

This book can be viewed as a first attempt to systematically develop an algebraic theory of nonlinear differential equations, both ordinary and partial. The main goal of the author was to construct a theory of elimination, which “will reduce the

existence problem for a finite or infinite system of algebraic differential equations to the application of the implicit function theorem taken with Cauchy’s theorem in the ordinary case and Riquier’s in the partial.” In his 1934 review of the book, J. M. Thomas called it “concise, readable, original, precise, and stimulating”, and his words still remain true.

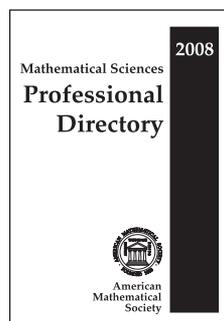
A more fundamental and complete account of further developments of the algebraic approach to differential equations is given in Ritt’s treatise *Differential Algebra*, written almost 20 years after the present work (Colloquium Publications, Vol. 33, American Mathematical Society, 1950).

Contents: Decomposition of a system of ordinary algebraic differential equations into irreducible systems; General solutions and resolvents; First applications of the general theory; Systems of algebraic equations; Constructive methods; Constitution of an irreducible manifold; Analogue of the Hilbert-Netto theorem. Theoretical decomposition process; Analogue for form quotients of Lüroth’s theorem; Riquier’s existence theorem for orthonomic systems; Systems of algebraic partial differential equations; Index.

Colloquium Publications, Volume 14

December 1932, 172 pages, Softcover, ISBN: 978-0-8218-4605-6, LC 32-35201, 2000 *Mathematics Subject Classification*: 12-02; 12H05, **AMS members US\$32**, List US\$40, Order code COLL/14

General and Interdisciplinary

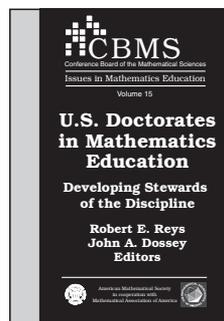


Mathematical Sciences Professional Directory, 2008

This annual directory provides a handy reference to various organizations in the mathematical sciences community. Listed in the directory are the following: contact (address, phone, fax) info and websites of over thirty professional mathematical organizations; addresses of selected

government agencies; academic departments in the mathematical sciences; and alphabetic listings of colleges and universities.

July 2008, 153 pages, Softcover, ISBN: 978-0-8218-4451-9, List US\$55, Institutional member US\$44, Order code PRODIR/2008



U.S. Doctorates in Mathematics Education

Developing Stewards of the Discipline

Robert E. Reys, *University of Missouri, Columbia, MO*, and John A. Dossey, *Illinois State University, Eureka, IL*, Editors

Mathematics education in the United States will be shaped at all levels by those who hold doctorates in the field. As professors, they influence the structure and content of university programs in mathematics education, where future teachers are prepared. As scholars, they engage in research and lead us to a deeper and better understanding of the field. This book is a detailed study of doctoral programs in mathematics education. It stems from a national conference sponsored by the National Science Foundation. It involved participants from across the United States, as well as Brazil, Japan, Norway, and Spain, and followed up the work of an earlier conference, published in *One Field, Many Paths: U.S. Doctoral Programs in Mathematics Education* (Volume 9 in this series).

The book, as was the conference, is organized around several major questions, including: What is the core knowledge for doctoral students in mathematics education? What are the important issues and challenges in delivering doctoral programs? What can we learn about doctoral preparation by comparisons with other countries? What effect would accreditation of doctoral programs in mathematics education have on the profession? What next steps need to be addressed now?

The book documents the wide range of ideas about doctoral programs in mathematics education and their varied features. It provides readers with current visions and issues concerning doctoral studies in the field and serves as a reminder that establishing stewards of the discipline of mathematics education is a continuing challenge.

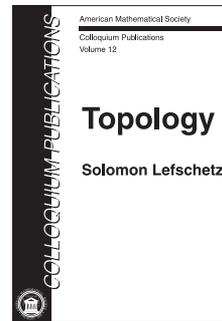
This series is published in cooperation with the Mathematical Association of America.

Contents: *Part 1: Background:* R. Reys, R. Glasgow, D. Teuscher, and N. Nevels, Doctoral production in mathematics education in the United States: 1960–2005; R. Reys, R. Glasgow, D. Teuscher, and N. Nevels, Doctoral programs in mathematics education in the United States: 2007 status report; D. Teuscher, N. Nevels, and C. Ulrich, Report of a 2007 survey of U. S. doctoral students in mathematics education; *Part 2: Developing stewards of the discipline: core elements:* C. M. Golde, Creating a broader vision of doctoral education: Lessons from the Carnegie Initiative on the Doctorate; J. Ferrini-Mundy, What core knowledge do doctoral students in mathematics education need to know?; *Breakout sessions:* D. Chazan and W. J. Lewis, The mathematical education of doctorates in mathematics education; R. M. Zbiek and C. R. Hirsch, Curriculum as core knowledge; E. Silver and E. Walker, Making policy issues visible in the doctoral preparation of mathematics educators; P. S. Wilson and M. Franke, Preparing teachers in mathematics education doctoral programs: Tensions and strategies; E. V. Taylor and R. Kitchen, Doctoral programs in mathematics education: Diversity and equity; M. K. Heid and H. S. Lee, Using technology in teaching and learning mathematics: What should doctoral students in mathematics education know?; *Part 3: Developing stewards of the discipline: delivery systems:* D. S. Mewborn, Program delivery issues, opportunities, and challenges; *Breakout sessions:* J. A. Middleton and B. Dougherty, Doctoral preparation of researchers; W. S. Bush and E. Galindo, Key components of mathematics education doctoral programs in the United States: Current practices and suggestions for improvement; M. Burke and V. M. Long, On-line delivery graduate courses in mathematics education; G. Kersaint and G. A. Goldin, Mathematics education doctoral programs: Approaches to part-time students; B. J. Reys, G. M. Lloyd, K. Marrongelle, and M. S. Winsor, Induction of doctoral graduates in mathematics education into the profession; *Part 4: Doctoral programs in mathematics education: Some international perspectives:* J. Kilpatrick, Doctoral programs in mathematics education: An international perspective; B. S. D'ambrosio, Doctoral studies in mathematics education: Unique features of Brazilian programs; B. Grevholm, Nordic doctoral programs in didactics of mathematics; M. Koyama, Japanese doctoral programs in mathematics education: Academic or professional; L. Rico, A. Fernández-Cano, E. Castro, and M. Torralbo, Post-graduate study program in mathematics education at the University of Granada (Spain); *Part 5: Accreditation:* G. Lappan, J. Newton, and D. Teuscher, Accreditation of doctoral programs: A lack of consensus; *Part 6: Reflections from within:* A. Tyminski, Preparing the next generation of mathematics educators: An assistant professor's experience; D. Kirshner and T. Ricks, Mathematics content for elementary mathematics education graduate students: Overcoming the prerequisites hurdle; D. Teuscher, A. M. Marshall, J. Newton, and C. Ulrich, Intellectual communities: Promoting collaboration within and across doctoral programs in mathematics education; *Part 7: Closing commentary:* J. Hiebert, D. Lambdin, and S. Williams, Reflecting on the conference and looking toward the future; Appendices.

CBMS Issues in Mathematics Education, Volume 15

July 2008, 271 pages, Softcover, ISBN: 978-0-8218-4584-4, LC 2008017013, 2000 *Mathematics Subject Classification:* 97-XX, 00-XX, AMS members US\$44, List US\$55, Order code CBMATH/15

Geometry and Topology



Topology

Solomon Lefschetz

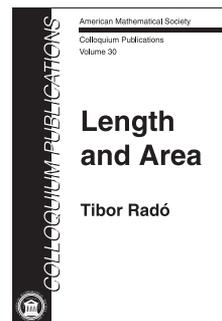
Lefschetz's *Topology* was written in the period in between the beginning of topology, by Poincaré, and the establishment of algebraic topology as a well-formed subject, separate from point-set or geometric topology. At this time, Lefschetz had already proved his first fixed-point theorems. In some sense, the present book is a description of the

broad subject of topology into which Lefschetz's theory of fixed points fits. Lefschetz takes the opportunity to describe some of the important applications of his theory, particularly in algebraic geometry, to problems such as counting intersections of algebraic varieties. He also gives applications to vector distributions, complex spaces, and Kronecker's characteristic theory.

Contents: Elementary combinatorial theory of complexes; Topological invariance of the homology characters; Manifolds and their duality theorems; Intersections of chains on a manifold; Product complexes; Transformations of manifolds, their coincidences and fixed points; Infinite complexes and their applications; Applications to analytical and algebraic varieties; Bibliography; Addenda; Index.

Colloquium Publications, Volume 12

December 1930, 413 pages, Softcover, ISBN: 978-0-8218-4603-2, LC 31-10604, 2000 *Mathematics Subject Classification:* 54-02, 55-02, AMS members US\$61, List US\$76, Order code COLL/12



Length and Area

Tibor Radó

Radó's colloquium is a systematic treatment of Lebesgue theory, with an emphasis on the work of Morrey and of Radó and his students, especially in two dimensions. At the time, there were important current problems surrounding Lebesgue's theory for parameterized and unparameterized surfaces, which the book addresses. The exposition begins with

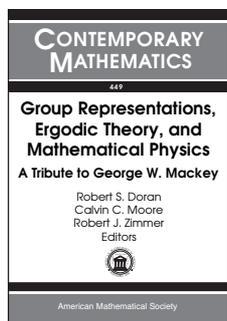
reviews of Lebesgue integration and relevant topics in topology, including Fréchet equivalence, the approximation of monotone maps by homeomorphisms, Peano spaces, and a discussion of the topological index of maps into the plane. After a development of further ideas and tools from topology and measure theory, Radó addresses an essential question that equates two sorts of areas for surfaces represented by maps of a 2-cell or a 2-sphere into 3-space.

Contents: Background material; Curves and surfaces; Arc length and related topics; Plane transformations; Surface area; Bibliography; Index.

Colloquium Publications, Volume 30

December 1948, 572 pages, Softcover, ISBN: 978-0-8218-4621-6, LC 48-3259, 2000 *Mathematics Subject Classification:* 28-02, AMS members US\$79, List US\$99, Order code COLL/30

Mathematical Physics



Group Representations, Ergodic Theory, and Mathematical Physics

A Tribute to George W. Mackey

Robert S. Doran, *Texas Christian University, Fort Worth, TX*,
Calvin C. Moore, *University of*

California, Berkeley, CA, and Robert J. Zimmer, *University of Chicago, IL*, Editors

George Mackey was an extraordinary mathematician of great power and vision. His profound contributions to representation theory, harmonic analysis, ergodic theory, and mathematical physics left a rich legacy for researchers that continues today. This book is based on lectures presented at an AMS special session held in January 2007 in New Orleans dedicated to his memory. The papers, written especially for this volume by internationally known mathematicians and mathematical physicists, range from expository and historical surveys to original high-level research articles. The influence of Mackey's fundamental ideas is apparent throughout. The introductory article contains recollections from former students, friends, colleagues, and family as well as a biography describing his distinguished career as a mathematician at Harvard, where he held the Landon D. Clay Professorship of Mathematics.

Topics examined here include recent results on induced representations, virtual groups, the Mackey Machine and crossed products, representations of Baumslag-Solitar groups, the Radon transform and the heat equation, groupoids in the study of wavelets, and quantum theory. The in-depth historical surveys of Mackey's work on representation theory, ergodic theory, and physics, together with recent developments inspired by his fundamental work will be of considerable interest to both graduate students and researchers alike.

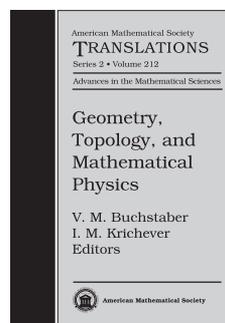
This item will also be of interest to those working in general and interdisciplinary areas.

Contents: R. S. Doran and A. Ramsay, George Mackey 1916–2006; S. Adams, Decay to zero of matrix coefficients at adjoint infinity; J. Arthur, Induced representations, intertwining operators and transfer; L. G. Brown, MASA's and certain type I closed faces of C^* -algebras; D. E. Dutkay and P. E. T. Jorgensen, A duality approach to representations of Baumslag-Solitar groups; S. Echterhoff and D. P. Williams, The Mackey machine for crossed products: Inducing primitive ideals; E. G. Effros, Classifying the unclassifiables; N. Higson, The Mackey analogy and K -theory; R. E. Howe, Some recent applications of induced representations; M. Ionescu and P. S. Muhly, Groupoid methods in wavelet analysis; A. Jaffe, Quantum theory and relativity; A. A. Kirillov, Thoughts about George Mackey and his imprimitivity theorem; C. C. Moore, Virtual groups 45 years later; F. Murnaghan, Spherical characters: The supercuspidal case; G. Ólafsson and H. Schlichtkrull, Representation theory, radon transform and the heat equation on a Riemannian symmetric space; J. A. Packer, Projective representations and the Mackey obstruction—A survey; A. Ramsay,

Virtual groups for group representations; M. A. Rieffel, A global view of equivariant vector bundles and Dirac operators on some compact homogeneous spaces; V. S. Varadarajan, George Mackey and his work on representation theory and foundations of physics.

Contemporary Mathematics, Volume 449

January 2008, 446 pages, Softcover, ISBN: 978-0-8218-4225-6, LC 2007060574, 2000 *Mathematics Subject Classification*: 22D10, 22D30, 22E50, 28A05, 43A07, 46L05, 58J60, 81-02, 81P10, 81T08, **AMS members US\$95**, List US\$119, Order code CONM/449



Geometry, Topology, and Mathematical Physics

S. P. Novikov's Seminar: 2006–2007

V. M. Buchstaber, *Steklov Institute of Mathematics, Moscow, Russia*, and I. M. Krichever, *Columbia University, New York, NY*, Editors

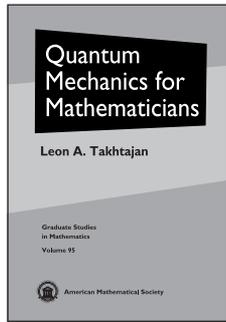
This volume contains a selection of papers based on presentations given in 2006–2007 at the S. P. Novikov Seminar at the Steklov Mathematical Institute in Moscow. Novikov's diverse interests are reflected in the topics presented in the book. The articles address topics in geometry, topology, and mathematical physics. The volume is suitable for graduate students and researchers interested in the corresponding areas of mathematics and physics.

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

Contents: A. V. Alexeevski and S. M. Natanzon, Hurwitz numbers for regular coverings of surfaces by seamed surfaces and Cardy-Frobenius algebras of finite groups; V. M. Buchstaber and S. Terzić, Equivariant complex structures on homogeneous spaces and their cobordism classes; B. Dubrovin, On universality of critical behaviour in Hamiltonian PDEs; M. Feigin and A. P. Veselov, On the geometry of \vee -systems; P. G. Grinevich and I. A. Taimanov, Spectral conservation laws for periodic nonlinear equations of the Melnikov type; S. M. Gusein-Zade, I. Luengo, and A. Melle-Hernández, An equivariant version of the monodromy zeta function; A. Hamilton and A. Lazarev, Symplectic \mathcal{A}_∞ -algebras and string topology operations; H. M. Khudaverdian and T. T. Voronov, Differential forms and odd symplectic geometry; I. Krichever and T. Shiota, Abelian solutions of the KP equation; A. Y. Maltsev, Deformations of the Whitham systems in the almost linear case; O. I. Mokhov, Frobenius manifolds as a special class of submanifolds in pseudo-Euclidean spaces; M. V. Pavlov, Integrability of the Gibbons-Tsarev system; A. K. Pogrebkov, 2D toda chain and associated commutator identity; O. K. Sheinman, On certain current algebras related to finite-zone integration.

American Mathematical Society Translations—Series 2 (*Advances in the Mathematical Sciences*), Volume 224

September 2008, approximately 285 pages, Hardcover, ISBN: 978-0-8218-4674-2, LC 91-640741, 2000 *Mathematics Subject Classification*: 00B25, **AMS members US\$87**, List US\$109, Order code TRANS2/224



Quantum Mechanics for Mathematicians

Leon A. Takhtajan, *Stony Brook University, NY*

This book provides a comprehensive treatment of quantum mechanics from a mathematics perspective and is accessible to mathematicians starting with second-year graduate students. In addition to traditional topics, like classical

mechanics, mathematical foundations of quantum mechanics, quantization, and the Schrödinger equation, this book gives a mathematical treatment of systems of identical particles with spin, and it introduces the reader to functional methods in quantum mechanics. This includes the Feynman path integral approach to quantum mechanics, integration in functional spaces, the relation between Feynman and Wiener integrals, Gaussian integration and regularized determinants of differential operators, fermion systems and integration over anticommuting (Grassmann) variables, supersymmetry and localization in loop spaces, and supersymmetric derivation of the Atiyah-Singer formula for the index of the Dirac operator. Prior to this book, mathematicians could find these topics only in physics textbooks and in specialized literature.

This book is written in a concise style with careful attention to precise mathematics formulation of methods and results. Numerous problems, from routine to advanced, help the reader to master the subject. In addition to providing a fundamental knowledge of quantum mechanics, this book could also serve as a bridge for studying more advanced topics in quantum physics, among them quantum field theory.

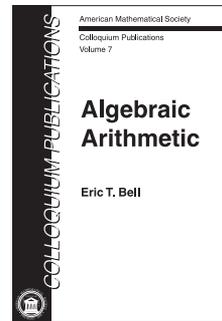
Prerequisites include standard first-year graduate courses covering linear and abstract algebra, topology and geometry, and real and complex analysis.

Contents: *Foundations:* Classical mechanics; Basic principles of quantum mechanics; Schrödinger equation; Spin and identical particles; *Functional methods and supersymmetry:* Path integral formulation of quantum mechanics; Integration in functional spaces; Fermion systems; Supersymmetry; Bibliography; Index.

Graduate Studies in Mathematics, Volume 95

September 2008, approximately 389 pages, Hardcover, ISBN: 978-0-8218-4630-8, LC 2008013072, 2000 *Mathematics Subject Classification:* 81-01, **AMS members US\$55**, List US\$69, Order code GSM/95

Number Theory



Algebraic Arithmetic

Eric T. Bell

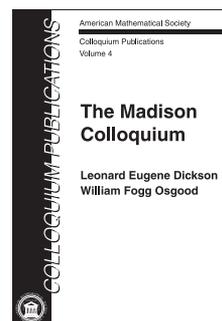
The central topic of this book is the presentation of the author's principle of arithmetical paraphrases, which won him the Bôcher Prize in 1924. This general principle served to unify and extend many isolated results in the theory of numbers. The author successfully provides a systematic attempt to find a unified theory for each of various classes

of related important problems in the theory of numbers, including its interrelations with algebra and analysis. This book will be of interest to advanced students in various branches of mathematics, including number theory, abstract algebra, elliptic and theta functions, Bernoulli numbers and functions, and the foundations of mathematics.

Contents: Introduction; Varieties of algebra useful in algebraic arithmetic; The algebra \mathcal{B} of parity; The algebraic arithmetic of multiply periodic functions; Applications of the algebras \mathcal{C} , \mathcal{D} ; Arithmetical structure; Index.

Colloquium Publications, Volume 7

December 1927, 180 pages, Softcover, ISBN: 978-0-8218-4601-8, LC 28-28412, 2000 *Mathematics Subject Classification:* 11-02, **AMS members US\$33**, List US\$41, Order code COLL/7



The Madison Colloquium

Leonard Eugene Dickson and William Fogg Osgood

Following the tradition of the American Mathematical Society, the seventh colloquium of the Society was held as part of the summer meeting that took place at the University of Wisconsin, in Madison.

Two sets of lectures were presented: *On*

Invariants and the Theory of Numbers, by L. E. Dickson, and *Functions of Several Complex Variables*, by W. F. Osgood.

Dickson considers invariants of quadratic forms, with a special emphasis on invariants of forms defined in characteristic p , also called modular invariants, which have number-theoretic consequences. He is able to find a fundamental set of invariants for both settings. For binary forms, Dickson introduces semi-invariants in the modular case, and again finds a fundamental set. These studies naturally lead to the important study of invariants of the standard action of the modular group. The lectures conclude with a study of "modular geometry", which is now known as geometry over F_p .

The lectures by Osgood review the state of the art of several complex variables. At this time, the theory was entirely function-theoretic. Already, though, Osgood can introduce the ideas and theorems that will be fundamental to the subject for the rest of the century: Weierstrass preparation, periodic functions and theta functions,

singularities—including Hartogs’ phenomenon, the boundary of a domain of holomorphy, and so on.

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

Contents: **L. E. Dickson**, On invariants and the theory of numbers; **W. F. Osgood**, Topics in the theory of functions of several complex variables.

Colloquium Publications, Volume 4

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New AMS-Distributed Publications

Number Theory

Diophantine Equations

N. Saradha, *Tata Institute of Fundamental Research, Mumbai, India, Editor*

The study of Diophantine equations has a long and rich history, getting its impetus with the advent of Baker’s theory of linear forms in logarithms, in the 1960’s. T. N. Shorey’s contribution to Diophantine equations, based on Baker’s theory, is widely acclaimed. An international conference was held at the Tata Institute of Fundamental Research, Mumbai from December 16–20 2005, in his honor. This volume has evolved out of the papers contributed by several participants and non-participants of the conference. These articles reflect the various aspects of exponential Diophantine equations from experts in the field.

A publication of the Tata Institute of Fundamental Research. Distributed worldwide except in India, Bangladesh, Bhutan, Maldives, Nepal, Pakistan, and Sri Lanka.

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