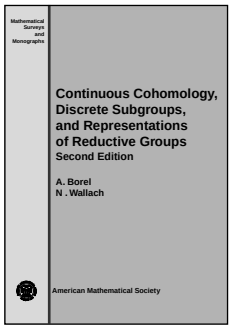
New Publications Offered by the AMS

New Series from the AMS! The AMS is pleased to announce a new subseries of the *Translations in Mathematical Monographs* publications entitled, *Iwanami Series in Modern Mathematics*. The books will present English translations of original Japanese works from Iwanami Shoten publishers (Tokyo). We will offer affordably-priced volumes from two Iwanami Shoten series: *Foundations of Modern Mathematics* and *Developments of Modern Mathematics*. Information about the inaugural publication is included in this month's *New Publications Offered by the AMS* section of the *Notices*, see page 383.

Algebra and Algebraic Geometry



Continuous Cohomology, Discrete Subgroups, and Representations of Reductive Groups

Second Edition

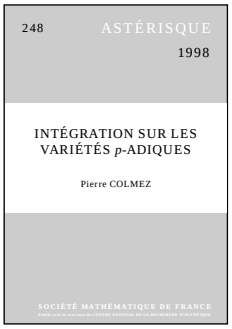
A. Borel, *Institute for Advanced Study, Princeton, NJ*, and **N. Wallach**, *University of California, San Diego, La Jolla*

It has been nearly twenty years since the first edition of this work. In the intervening years, there has been immense progress in the use of homological algebra to construct admissible representations and in the study of arithmetic groups. This second edition is a corrected and expanded version of the original, which was an important catalyst in the expansion of the field. Besides the fundamental material on cohomology and discrete subgroups present in the first edition, this edition also contains expositions of some of the most important developments of the last two decades.

Contents: Notation and preliminaries; Relative Lie algebra cohomology; Scalar product, Laplacian and Casimir element; Cohomology with respect to an induced representation; The Langlands classification and uniformly bounded representations; Cohomology with coefficients in $\Pi_\infty(G)$; The computation of certain cohomology groups; Cohomology of discrete subgroups and Lie algebra cohomology; The construction of certain unitary representations and the computation of the corresponding cohomology groups; Continuous cohomology and differentiable cohomology; Continuous and differentiable cohomology for locally compact totally disconnected groups; Cohomology with coefficients in $\Pi_\infty(G)$: The p-adic case; Differentiable cohomology for products of real Lie groups and t.d. groups; Cohomology of discrete cocompact subgroups; Noncompact S-arithmetic subgroups; References; Index; Leitfaden to some results.

Mathematical Surveys and Monographs

June 1999, approximately 265 pages, Hardcover, ISBN 0-8218-0851-6, LC 98-44527, 1991 *Mathematics Subject Classification*: 22E41; 22E40, 22E45, 57T15, **All AMS members $47**, List $59, Order code SURV-BORELN



Intégration sur les Variétés p-Adiques

Pierre Colmez, *École Normale Supérieure, Paris, France*

A publication of Société Mathématique de France.

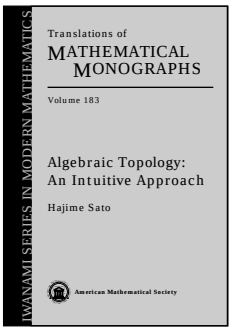
In this book, the author shows that there is a unique "reasonable" way of integrating closed 1-forms on smooth algebraic varieties defined over a p-adic field. In contrast with the previously known constructions, this p-adic integration does not require that the varieties under consideration have good reduction. Having a theory which works for all primes can be used to adelize certain constructions. For example, if X is a smooth and proper algebraic curve defined over a number field, one can define in a purely analytic way a pairing between divisors of degree 0 using adelic Green functions. From this pairing one can recover the Néron-Tate height pairing and p-adic analogues considered by Gross and Coleman in the case of good reduction.

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; Intégrales abéliennes complexes; Intégrales abéliennes p-adiques; Ensembles bornés; Revêtements universels p-adiques; Résultats de théorie des groupes; Bibliographie.

Astérisque, Number 248

September 1998, 155 pages, Softcover, 1991 *Mathematics Subject Classification*: 11S, 14H, 14K, 14L, 30F, 30G, 32J, **Individual member $30**, List $33, Order code AST/248N



Recommended Text

Supplementary Reading

Algebraic Topology: An Intuitive Approach

Hajime Sato, *Nagoya University, Japan*

The single most difficult thing one faces when one begins to learn a new branch of mathematics is to get a feel for the mathematical sense of the subject. The purpose of this book is to help the aspiring reader acquire this essential common sense about algebraic topology in a short period of time. To this end, Sato leads the reader through simple but meaningful examples in concrete terms. Moreover, results are not discussed in their greatest possible generality, but in terms of the simplest and most essential cases.

In response to suggestions from readers of the original edition of this book, Sato has added an appendix of useful definitions and results on sets, general topology, groups and such. He has also provided references.

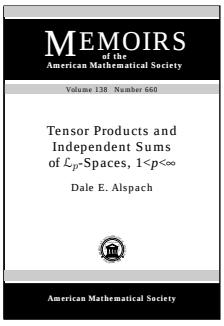
Topics covered include fundamental notions such as homeomorphisms, homotopy equivalence, fundamental groups and higher homotopy groups, homology and cohomology, fiber bundles, spectral sequences and characteristic classes. Objects and examples considered in the text include the torus, the Möbius strip, the Klein bottle, closed surfaces, cell complexes and vector bundles.

Contents: Objectives; Homeomorphisms and homotopy equivalences; Topological spaces and cell complexes; Fundamental groups and higher homotopy groups; Homology; Homology groups of cell complexes; Cohomology; Homology of product spaces and the universal coefficient theorem; Fiber bundles and vector bundles; Spectral sequences; A view from current mathematics; Appendix; Answers to exercises; Recommended reading; Index.

Translations of Mathematical Monographs (*Iwanami Series in Modern Mathematics*), Volume 183

February 1999, 122 pages, Softcover, ISBN 0-8218-1046-4, LC 98-53247, 1991 *Mathematics Subject Classification*: 55–01; 57–01, **All AMS members $16**, List $20, Order code MMONO/183N

Analysis



Tensor Products and Independent Sums of L_p-Spaces, $1 < p < \infty$

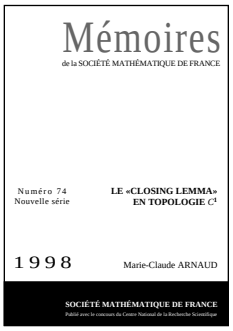
Dale E. Alspach, *Oklahoma State University, Stillwater*

Two methods of constructing infinitely many isomorphically distinct $\mathcal{L}_p$-spaces have been published. In this volume, the author shows that these constructions yield very different spaces and in the process develop methods for dealing with these spaces from the isomorphic viewpoint.

Contents: Introduction; The constructions of $\mathcal{L}_p$-spaces; Isomorphic properties of $(p, 2)$—sums and the spaces R_p^α; The isomorphic classification of R_p^α, $\alpha < \omega_1$; Isomorphisms from $X_p \otimes X_p$ into $(p, 2)$—sums; Selection of bases in $X_p \otimes X_p$; $X_p \otimes X_p$-preserving operators on $X_p \otimes X_p$; Isomorphisms of $X_p \otimes X_p$ onto complemented subspaces of $(p, 2)$—sums; $X_p \otimes X_p$ is not in the scale R_p^α, $\alpha < \omega_1$; Final remarks and open problems; Bibliography.

Memoirs of the American Mathematical Society, Volume 138, Number 660

March 1999, 77 pages, Softcover, ISBN 0-8218-0961-X, LC 98-53108, 1991 *Mathematics Subject Classification*: 46B20; 46E30, **Individual member $23**, List $39, Institutional member $31, Order code MEMO/138/660N



Le «Closing Lemma» en Topologie C^1

Marie-Claude Arnaud, *Université Paris Sud, Orsay, France*

A publication of Société Mathématique de France.

Using an algebraic result due to Mai, Arnaud gives a simpler proof of the C^1 closing lemma of Pugh and Robinson and gives a more precise result. A new case is solved: the case of symplectic vector fields.

The theorem of density of periodic points in the non-wandering set is deduced, as Pugh and Robinson did, adding a result on symplectic vector fields. Then, a new result is proven: the C^1 orbit closing lemma, which allows for transforming a recurrent point to a periodic one by approximating its orbit.

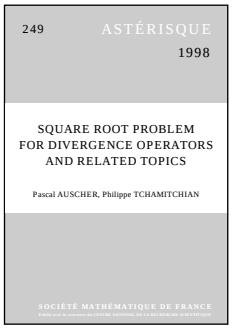
Arnaud gives a generalization of the ergodic version of the closing lemma of R. Mañé to the case of non-compact manifolds and positive Borel measures which are finite on compacta.

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

Contents: Introduction; Énoncés du ≪closing lemma≫; Les théorèmes de densité comprenant un lemme de fermeture d'orbite; Une version ergodique du ≪closing lemma≫; Plan de la démonstration du ≪closing lemma≫; Démonstration des résultats intermédiaires; Bibliographie.

Memoires de la Société Mathématique de France, Number 74

March 1999, approximately 126 pages, Softcover, ISBN 2-85629-071-X, 1991 *Mathematics Subject Classification*: 58F30, 58F22, 58F05, 58F11, 58F25, **Individual member $30**, List $33, Order code SMFMEM/74N*



Square Root Problem for Divergence Operators and Related Topics

Pascal Auscher, *Université de Picardie Jules-Verne, Amiens, France*, and **Philippe Tchamitchian**, *Université d'Aix-Marseille III, Marseille, France*

A publication of Société Mathématique de France.

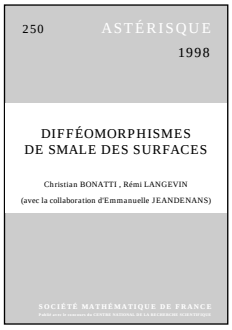
This work presents recent progress on the square root problem of Kato for differential operators in divergence form on $\mathbb{R}^n$. Topics discussed include functional calculus, heat and resolvent kernel estimates, square function estimates and Carleson measure estimates for square roots.

In the first chapter, it is shown in a quantitative way how the theorems of Aronson-Nash and De Giorgi are equivalent. The central chapters use recent developments in functional calculus and harmonic analysis to propose a new point of view on Kato's problem, unifying previous results and extending them. The last chapter examines the associated Riesz transforms, their relation to Calderón-Zygmund operators and their behavior on L^p-spaces.

Contents: Introduction; Preliminaries; Gaussian estimates; Quadratic functionals, Carleson measures and square roots of differential operators; Positive answers to the square root problem; Square roots of differential operators, singular integrals and L^p theory; The space ABMO; Coefficients depending on one variable; Improved constants; Reduction of dimension principle; Bibliography.

Astérisque, Number 249

October 1998, 172 pages, 1991 *Mathematics Subject Classification*: 35J15, 47A60, 42B25; 42B20, 35K10, 47F05, 46G20, **Individual member $50**, List $55, Order code AST/249N*



Difféomorphismes de Smale des Surfaces

Christian Bonatti and **Rémi Langevin**, *Université de Bourgogne, Dijon, France*

A publication of Société Mathématique de France.

This work is devoted to the C^1-structurally stable diffeomorphisms (called here *Smale diffeomorphisms*) of compact surfaces.

The main result consists in a finite combinatorial presentation of the global topological dynamics (*i.e.* the class of topological conjugacy) of Smale diffeomorphisms. For that the authors consider *saturated hyperbolic sets* (*i.e.* hyperbolic sets which are equal to the intersection of their invariants manifolds) and build some canonical (up to conjugacy) invariant neighborhood (the *domain*) of these saturated sets. Then they prove that the dynamics restricted to the domain is characterized by the *geometrical type* of some Markov partition of the hyperbolic set: it is a simple combinatorics describing in which order, position and direction the image of some rectangle of the Markov partition crosses the rectangles. Then the global dynamic is obtained by gluing the domains along their boundary.

One important step of the proof consists in a precise analysis of the topological position (the *pattern*) of the invariant curves of the Smale diffeomorphisms. As a corollary of the main result the authors determine that the pattern of the invariant curves essentially characterizes the dynamics on the domains.

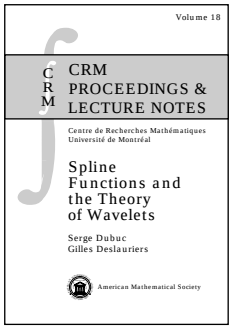
Some of the abstract geometrical types do not correspond to any Smale diffeomorphisms on compact surfaces. The authors define the genus of a type, as a minorant of the genus of any compact surface on which the type can be realized as the geometrical type of a Markov partition of some saturated hyperbolic set; then they characterize the geometrical types of finite genus.

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

Contents: Introduction; Pièces basiques et ensembles saturés; Géométrie des courbes invariantes; Domaine d'un ensemble hyperbolique saturé; Construction de partitions de Markov; Partitions de Markov géométrisées et conjugaison topologique de difféomorphismes de Smale; Les dessins et la dynamique; Genre d'une partition de Markov géométrique et réalisabilité (par C. Bonatti et E. Jeandenans); Pièces basiques et homéomorphismes pseudo-Anosov (par C. Bonatti et E. Jeandenans); Bibliographie.

Astérisque, Number 250

October 1998, 235 pages, Softcover, 1991 *Mathematics Subject Classification*: 58F15, 58F09, 58F12, **Individual member $50**, List $55, Order code AST/250N*



Spline Functions and the Theory of Wavelets

Serge Dubuc, *Université de Montréal, PQ, Canada*, and **Gilles Deslauriers**, *Ecole Polytechnic de Montréal, PQ, Canada*, Editors

This work is based on a series of thematic workshops on the theory of wavelets and the theory of splines. Important applications are included. The volume is divided into four parts: Spline Functions, Theory of Wavelets, Wavelets in Physics, and Splines and Wavelets in Statistics.

Part one presents the broad spectrum of current research in the theory and applications of spline functions. Theory ranges from classical univariate spline approximation to an abstract framework for multivariate spline interpolation. Applications include scattered-data interpolation, differential equations and various techniques in CAGD.

Part two considers two developments in subdivision schemes; one for uniform regularity and the other for irregular situations. The latter includes construction of multidimensional wavelet bases and determination of bases with a given time frequency localization.

In part three, the multifractal formalism is extended to fractal functions involving oscillating singularites. There is a review of a method of quantization of classical systems based on the theory of coherent states. Wavelets are applied in the domains of atomic, molecular and condensed-matter physics.

In part four, ways in which wavelets can be used to solve important function estimation problems in statistics are shown. Different wavelet estimators are proposed in the following distinct cases: functions with discontinuities, errors that are no longer Gaussian, wavelet estimation with robustness, and error distribution that is no longer stationary.

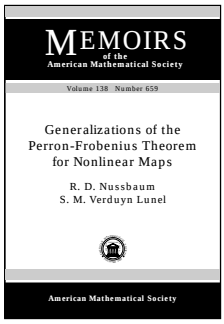
Some of the contributions in this volume are current research results not previously available in monograph form. The volume features many applications and interesting new theoretical developments. Readers will find powerful methods for studying irregularities in mathematics, physics, and statistics.

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

Contents: *Spline functions:* **L. P. Bos** and **D. Holland**, Radial extensions of vertex data; **H. Brunner**, The use of splines in the numerical solutions of differential and Volterra integral equations; **F. Dubeau** and **J. Savoie**, On best error bounds for deficient splines; **F. Dubeau** and **J. Savoie**, Optimal error bounds for spline interpolation on a uniform partition; **J.-P. Dussault** and **N. Pfister**, Modelization of flexible objects using constrained optimization and B-spline surfaces; **J. C. Fiorot** and **P. Jeannin**, New control polygons for polynomial curves; **A. Le Méhauté** and **A. Bouhamidi**, Splines in approximation and differential operators: (m, ℓ, s) interpolating-spline; **P. Sablonnière**, New families of B-splines on uniform meshes of the plane; *Theory of wavelets:* **N. Dyn** and **D. Levin**, Analysis of Hermite-interpolatory subdivision schemes; **M. Holschneider**, Some directional microlocal classes defined using wavelet transforms; **A. Karoui** and **R. Vaillancourt**, Nonseparable biorthogonal wavelet bases of $L^2(\mathbb{R}^n)$; **J. Kovačević** and **R. Bernardini**, Local bases: Theory and applications; **K.-S. Lau** and **M.-F. Ma**, On the L^p-Lipschitz exponents of the scaling functions; **S. Maes**, Robust speech and speaker recognition using instantaneous frequencies and amplitudes obtained with wavelet-derived synchrosqueezing measures; **E. Schulz** and **K. F. Taylor**, Extensions of the Heisenberg group and wavelet analysis in the plane; *Wavelets in physics:* **S. Twareque Ali**, Coherent states and quantization; **J.-P. Antoine**, Wavelets in molecular and condensed-matter physics; **J.-P. Antoine**, **Ph. Antoine**, and **B. Piraux**, Wavelets in atomic physics; **G. Battle**, The wavelet ϵ-expansion and Hausdorff dimension; **J. Elezgaray**, **G. Berkooz**, and **P. Holmes**, Modelling the coupling between small and large scales in the Kuramoto-Sivashinsky equation; **C. R. Handy** and **R. Murenzi**, Continuous wavelet transform analysis of one-dimensional quantum ground states; **A. Arneodo**, **E. Bacry**, **S. Jaffard**, and **J. F. Muzy**, Oscillating singularities and fractal functions; *Splines and wavelets in statistics:* **A. Antoniadis**, Wavelet estimators for change-point regression models; **R. Averkamp** and **C. Houdré**, Wavelet thresholding for non (necessarily) Guassian noise: A preliminary report; **D. L. Donoho** and **T. P. Y. Yu**, Deslauries-Dubuc: Ten years after; **J. O. Ramsay** and **N. Heckman**, Some theory for L-spline smoothing; **R. von Sachs**, **G. P. Nason**, and **G. Kroisandt**, Spectral representation and estimation for locally stationary wavelet processes.

CRM Proceedings & Lecture Notes, Volume 18

April 1999, 397 pages, Softcover, ISBN 0-8218-0875-3, 1991 *Mathematics Subject Classification*: 65D07, 41A30; 41A15, 42C15, 94A12, 65D15, 81V45, 62G07, **Individual member $66**, List $110, Institutional member $88, Order code CRMP/18N



Generalizations of the Perron-Frobenius Theorem for Nonlinear Maps

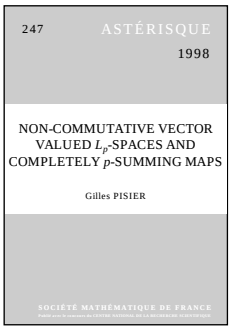
R. D. Nussbaum, *Rutgers University, Piscataway, NJ*, and **S. M. Verduyn Lunel**, *Vrije University, Amsterdam, Netherlands*

The classical Frobenius-Perron Theorem establishes the existence of periodic points of certain linear maps in $\mathbb{R}^n$. The authors present generalizations of this theorem to nonlinear maps.

Contents: Introduction; Basic properties of admissible arrays; Further properties of admissible arrays; Computation of the sets $P(n)$; Necessary conditions for array admissible sets; Proof of Theorem C; $P(n) \neq Q(n)$ for general n; $P_2(n)$ satisfies rule A and rule B; The case of linear maps; Bibliography; Appendix A Description of the program; Appendix B Numerical data.

Memoirs of the American Mathematical Society, Volume 138, Number 659

March 1999, 98 pages, Softcover, ISBN 0-8218-0969-5, LC 98-53118, 1991 *Mathematics Subject Classification*: 47Nxx, **Individual member $24**, List $40, Institutional member $32, Order code MEMO/138/659N



Non-Commutative Vector Valued L_p-Spaces and Completely p-Summing Maps

Gilles Pisier, *Texas A&M University, College Station*

A publication of Société Mathématique de France.

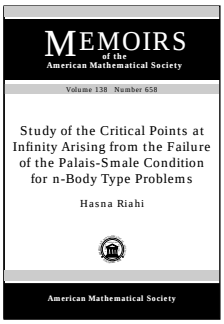
The author introduces a non-commutative analog of Banach space valued L_p-spaces in the category of operator spaces. The approach developed in the first part of the book naturally leads to a theory of "completely p-summing maps" between operator spaces, analogous to the Grothendieck-Pietsch-Kwapień theory (*i.e.* "absolutely p-summing maps") for Banach spaces. As an application, a characterization of maps factoring through the operator space version of Hilbert space is obtained. More generally, the mappings between operator spaces which factor through a non-commutative L_p-space (or through an ultraproduct of them) using completely p-summing maps are studied. Also discussed in this setting is the factorization through subspaces, or through quotients of subspaces of L_p-spaces.

Contents: Introduction; Background and Notation; Non-commutative vector valued L_p-spaces (discrete case); The operator space structure of the commutative L_p-spaces; Non-commutative vector valued L_p-spaces (continuous case); Duality, non-commutative RNP and uniform convexity; Completely p-summing maps; Operators factoring through

OH; Completely bounded factorization through L_p, S_p and utraproducts; Illustrations in concrete situations; Bibliography.; Index

Astérisque, Number 247

July 1998, 129 pages, Softcover, 1991 *Mathematics Subject Classification*: 46L50, 46E40, 46B70, 47B10, 47D15, **Individual member $30**, List $33, Order code AST/247N*



Study of the Critical Points at Infinity Arising from the Failure of the Palais-Smale Condition for n-Body Type Problems

Hasna Riahi, *Ecole Nationale d'Ingénieurs de Tunis, Tunisia*

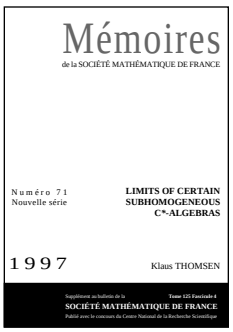
In this work, the author examines the following: When the Hamiltonian system $m_i\ddot{q}_i + (\partial V/\partial q_i)(t,q) = 0$ with periodicity condition $q(t+T) = q(t)$, $\forall t \in \Re$ (where $q_i \in \Re^\ell$, $\ell \geq 3$, $1 \leq i \leq n$, $q = (q_1, ..., q_n)$ and $V = \sum V_{ij}(t, q_i - q_j)$ with $V_{ij}(t, \xi)$ T-periodic in t and singular in ξ at $\xi = 0$) is posed as a variational problem, the corresponding functional does not satisfy the Palais-Smale condition and this leads to the notion of critical points at infinity.

This volume is a study of these critical points at infinity and of the topology of their stable and unstable manifolds. The potential considered here satisfies the strong force hypothesis which eliminates collision orbits. The details are given for 4-body type problems then generalized to n-body type problems.

Contents: Introduction; Breakdown of the Palais-Smale condition; Morse Lemma near infinity; A modified functional for the 4-body problem; Retraction theorem and related results for the 4-body problem; Generalization of the n-body problem.

Memoirs of the American Mathematical Society, Volume 138, Number 658

March 1999, 112 pages, Softcover, ISBN 0-8218-0873-7, LC 98-53119, 1991 *Mathematics Subject Classification*: 58E05; 34C25, 70F10, 70H05, **Individual member $25**, List $41, Institutional member $33, Order code MEMO/138/658N



Limits of Certain Subhomogeneous C^*-Algebras

Klaus Thomsen, *Institut for Matematiske fag, Aarhus C, Danmark*

A publication of Société Mathématique de France.

In this work, it is shown that the Elliott invariant is a complete invariant for the simple unital C^*-algebras which can be realized as an inductive limit of a sequence of finite direct sums of algebras of the form $\{f \in C(\mathbb{T}) \oplus M_n : f(x_i) \in M_d, i = 1, 2, \ldots, N\}$, where $x_1, x_2, \ldots, x_N$ is an arbitrary (finite) set on the circle $\mathbb{T}$ and d is a natural number dividing n. The corresponding range of invariants is identified and the classification result is extended to the non-unital case. A series of results about the structure of these C^*-algebras and the maps between them are also obtained.

Contents: Introduction; The building blocks; The KK-theory of building blocks of type 2; An appropriate uniqueness result; Injective connecting maps; Approximate divisibility; The final preparations; The main results; On the automorphism group; The range of the Elliott invariant; The non-unital case; Qualitative conclusions; Bibliography.

Memoires de la Société Mathématique de France, Number 71

September 1998, 125 pages, Softcover, ISBN 2-85629-064-7, 1991 *Mathematics Subject Classification*: 46L35, 46L80, 46M40, **Individual member $23**, List $26, Order code SMFMEM/71N*

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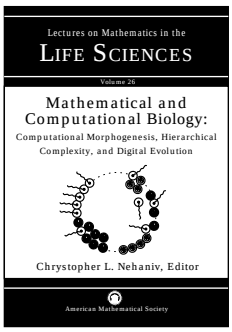
Applications



Mathematical and Computational Biology: Computational Morphogenesis, Hierarchical Complexity, and Digital Evolution

Chrystopher L. Nehaniv, *University of Hertfordshire, Hatfield, UK*, Editor

This volume contains 13 selected lectures from the International Workshop on Mathematical and Computational Biology subtitled "Computational Morphogenesis, Hierarchical Complexity and Digital Evolution" held at the University of Aizu (Japan). This interdisciplinary workshop brought together researchers working on aspects of evolutionary, mathematical, and computational biology that are of particular interest for

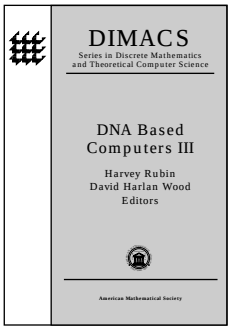
computer scientists, biologists, and mathematicians. Discussion topics include mathematical approaches for addressing evolutionary problems (such as replication, multicellularity, individuality, and morphogenesis), the theoretical tools for rigorously developing these questions, software systems and applications.

Of special concern were self-replication, the evolution of individuality, symbiogenesis, evolutionary developmental biology, computational morphogenesis, interaction dynamics, the evolution and maintenance of sex, and properties of the digital genetic code. Lectures are organized roughly according to increase of biological scale in the order of themes presented at the workshop.

Contents: E. Szathmáry, Chemes, genes, memes: A revised classification of replicators; **J. D. Lohn**, Cellular space models of self-replicating systems; **L. Bull**, On the evolution of eukaryotes: Computational models of symbiogenesis and multicellularity; **R. E. Michod** and **D. Roze**, Cooperation and conflict in the evolution of individuality. III: Transitions in the unit of fitness; **C. L. Nehaniv** and **J. L. Rhodes**, On the manner in which biological complexity may grow; **T. Unemi**, A simple evolvable development system in Euclidean space; **V. V. Savchenko**, **A. G. Basnakian**, and **A. A. Pasko**, Computer simulation and analysis of a growing mammalian cell colony; **J. R. Peck**, **J. M. Yearsley**, and **D. Waxman**, Why do asexual and self-fertilising populations tend to occur in marginal environments?; **K. Sigmund**, The social life of automata; **L. M. Schmitt** and **C. L. Nehaniv**, The linear geometry of genetic operators with applications to the analysis of genetic drift and genetic algorithms using tournament selection; **S. Okuyama**, Evolution of diseases; **G. Pirillo**, Maximal circular codes and applications to theoretical biology; **Q.-P. Gu**, **S. Peng**, and **Q.-M. Chen**, Sorting permutations and its application in genome analysis.

Lectures on Mathematics in the Life Sciences, Volume 26

April 1999, 201 pages, Softcover, ISBN 0-8218-0941-5, 1991 *Mathematics Subject Classification*: 92–06, 92–02, 92B05, 92D15, **Individual member $35**, List $59, Institutional member $47, Order code LLSCI/26N



DNA Based Computers III

Harvey Rubin, *University of Pennsylvania, Philadelphia*, and **David Harlan Wood**, *University of Delaware, Newark*, Editors

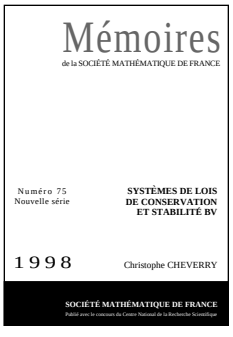
This volume presents the proceedings from the third DIMACS workshop on "DNA Based Computers" held at the University of Pennsylvania (Philadelphia). The workshop was part of the Special Year on Molecular Biology and the Special Year on DNA Computing. The focus of this proceedings volume is on the multidisciplinary nature of the workshop with emphasis on the interaction between biology and biochemistry on one hand and computer science and mathematics on the other.

Contents: J. G. Wetmur, Physical chemistry of nucleic acid hybridization; **A. J. Hartemink** and **D. K. Gifford**, Thermodynamic simulation of deoxyoligonucleotide hybridization for DNA computation; **J. Khodor** and **D. K. Gifford**, The efficiency of sequence-specific separation of DNA mixtures for biological computing; **J. Chen** and **D. H. Wood**, A new DNA separation technique with a low error rate; **M. Hagiya**, **M. Arita**, **D. Kiga**, **K. Sakamoto**, and **S. Yokoyama**, Towards parallel evaluation and learning of Boolean μ-formulas with molecules; **E. Laun** and **K. J. Reddy**, Wet splicing systems; **F. Guarnieri**, **M. Orlian**, and **C. Bancroft**, Parallel operations in DNA-based computation; **A. S. Fraenkel**, Protein folding, spin glass and computational complexity; **N. Jonoska**, **S. A. Karl**, and **M. Saito**, Creating 3-dimensional graph structures with DNA; **Y. Gao**, **M. Garzon**, **R. C. Murphy**, **J. A. Rose**, **R. Deaton**, **D. R. Franceschetti**, and **S. E. Stevens, Jr.**, DNA implementation of nondeterminism; **V. Gupta**, **S. Parthasarathy**, and **M. J. Zaki**, Arithmetic and logic operations with DNA; **L. F. Landweber**, **R. J. Lipton**, and **M. O. Rabin**, DNA^{2}DNA computations: A potential "killer app?"; **A. D. Ellington**, **M. P. Robertson**, **K. D. James**, and **J. C. Cox**, Strategies for DNA computing; **T. L. Eng** and **B. M. Serridge**, A surface-based DNA algorithm for minimal set cover; **N. Morimoto**, **M. Arita**, and **A. Suyama**, Solid phase DNA solution to the Hamiltonian path problem; **B. Fu** and **R. Beigel**, On molecular approximation algorithms for NP optimization problem; **J. H. Reif**, Local parallel biomolecular computation; **M. Ogihara** and **A. Ray**, DNA-based parallel computation by "counting"; **A. J. Blumberg**, Parallel computation on a DNA substrate; **M. Conrad** and **K.-P. Zauner**, Design for a DNA conformational processor; **T. L. Eng**, Linear DNA self-assembly with hairpins generates linear context-free grammars; **R. Freund**, **Gh. Păun**, **G. Rozenberg**, and **A. Salomaa**, Watson-Crick finite automata; **L. Kari**, **G. Păun**, **G. Thierrin**, and **S. Yu**, At the crossroads of DNA computing and formal languages: Characterizing recursively enumerable languages using insertion-deletion systems; **T. Yokomori** and **S. Kobayashi**, DNA-EC: A model of DNA-computing based on equality checking; **Y. Sakakibara** and **C. Ferretti**, Splicing on tree-like structures.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science

April 1999, approximately 351 pages, Hardcover, ISBN 0-8218-0842-7, LC 98-55491, 1991 *Mathematics Subject Classification*: 68Q40, 68U99, 68Q15, **Individual member $47**, List $79, Institutional member $63, Order code DIMACS-RUBINN

Differential Equations



Systèmes de Lois de Conservation et Stabilité BV

Christophe Cheverry, *CNRS, Rennes, France*

A publication of Société Mathématique de France.

In this volume, the Cauchy problem for strictly hyperbolic systems of conservation laws is considered. Classical results give the existence for all times if the total variation and the sup-norm of the initial data are small enough. The author discusses various situations where the restrictions on the variation can be relaxed.

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 Poin-

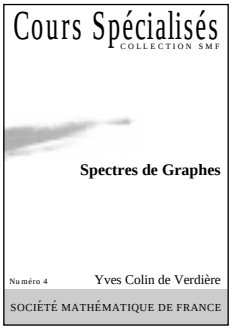
caré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Mise en place; Décroissance au sens large; Temps d'existence; Stabilité BV; Applications; Bibliographie.

Memoires de la Société Mathématique de France, Number 75

April 1999, approximately 112 pages, Softcover, ISBN 2-85629-072-8, 1991 *Mathematics Subject Classification*: 35L65, **Individual member $30**, List $33, Order code SMFMEM/75N

Discrete Mathematics and Combinatorics



Spectres de Graphes

Yves Colin de Verdière, *Institut Fourier, St. Martin d'Hères, France*

A publication of Société Mathématique de France.

The aim of this book is to develop for finite graphs some analogues of the spectral theory of Schrödinger operators on compact manifolds.

For graphs, the basic objects are sets of Schrödinger type operators (with or without magnetic fields). These sets include the canonical Laplacians on graphs, which are usually considered, as well as singular limits of continuous Schrödinger operators, singular limits of reversible Markov processes or finite elements methods.

After two introductory chapters of definitions and basic examples—functional analysis, Perron-Frobenius and Courant nodal theorems, eigenvalues perturbation theory—the following subjects are discussed: spectral gaps and Cheeger's inequalities, multiplicities of eigenvalues and Cheng's type theorem, discrete and continuous Schrödinger operators and electrical networks.

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

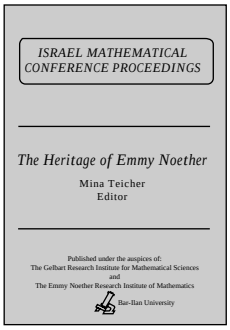
Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a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

Contents: Introduction; Définitions et exemples; Spectres; Le trou spectral des graphes et leurs propriétés d'expansion; Limites singulières et Γ-convergence; Multiplicités des valeurs propres et invariants associés; Discret et continu; Réseaux électriques; Bibliographie; Index.

Cours Spécialisés—Collection SMF, Number 4

October 1998, 114 pages, Softcover, ISBN 2-85629-068-X, 1991 *Mathematics Subject Classification*: 05C10, 05C15, 05C50, 35J10, 58G25, **Individual member $23**, List $26, Order code COSP/4N

General and Interdisciplinary



The Heritage of Emmy Noether

Mina Teicher, *Bar-Ilan University, Ramat-Gan, Israel*, Editor

A publication of Bar-Ilan University.

Named for the noted mathematician, the Emmy Noether Research Institute for Mathematics held a two-day conference dedicated to her heritage and her influence on mathematics and physics in the 20th and 21st centuries. This volume presents the proceedings of that conference. It includes a comprehensive description of her contributions to commutative and noncommutative algebra, algebraic geometry, topology, and physics given by world experts in these fields. Also included is a profile of her life. The volume is a comprehensive collection of Noether's valuable contributions to mathematics and physics.

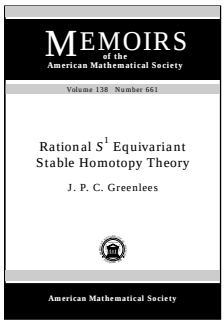
Distributed worldwide by the AMS.

Contents: M. Teicher, On Emmy Noether; **C. Procesi**, 150 years of invariant theory; **H. Flenner**, Emmy Noether and the development of commutative algebra; **W. Scharlau**, Emmy Noether's contributions to the theory of algebras; **F. Hirzebruch**, Emmy Noether and topology; **N. Byers**, E. Noether's discovery of the deep connection between symmetries and conservation laws; **Y. Ne'eman**, The impact of Emmy Noether's theorems on XXIst century physics.

Israel Mathematical Conference Proceedings, Volume 12

December 1998, 101 pages, Softcover, 1991 *Mathematics Subject Classification*: 13, 14, 16, 17; 54, **Individual member $23**, List $39, Institutional member $31, Order code IMCP/12N

Geometry and Topology



Rational S^1-Equivariant Stable Homotopy Theory

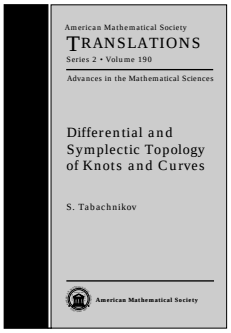
J. P. C. Greenlees, *University of Sheffield, England*

The memoir presents a systematic study of rational S^1-equivariant cohomology theories, and a complete algebraic model for them. It provides a classification of such cohomology theories in simple algebraic terms and a practical means of calculation. The power of the model is illustrated by analysis of the Segal conjecture, the behaviour of the Atiyah-Hirzebruch spectral sequence, the structure of S^1-equivariant K-theory, and the rational behaviour of cyclotomic spectra and the topological cyclic homology construction.

Contents: General introduction; *Part I. The algebraic model of rational $\mathbb{T}$-spectra:* Introduction to Part I; Topological building blocks; Maps between $\mathcal{F}$-free $\mathbb{T}$-spectra; Categorical reprocessing; Assembly and the standard model; The torsion model; *Part II. Change of groups functors in algebra and topology:* Introduction to Part II; Induction, coinduction and geometric fixed points; Algebraic inflation and deflation; Inflation, Lewis-May fixed points and quotients; *Part III. Applications:* Introduction to Part III; Homotopy Mackey functors and related constructions; Classical miscellany; Cyclic and Tate cohomology; Cyclotomic spectra and topological cyclic cohomology; *Part IV. Tensor and Hom in algebra and topology:* Introduction; Torsion functors; Torsion functors for the semifree standard model; Wide spheres and representing the semifree torsion functor; Torsion functors for the full standard model; Product functors; The tensor-Hom adjunction; The derived tensor-Hom adjunction; Smash products, function spectra and Lewis-May fixed points; Appendix A. Mackey functors; Appendix B. Closed model categories; Appendix C. Conventions; Appendix D. Indices; Appendix E. Summary of models; Bibliography.

Memoirs of the American Mathematical Society, Volume 138, Number 661

March 1999, 289 pages, Softcover, ISBN 0-8218-1001-4, LC 98-53107, 1991 *Mathematics Subject Classification*: 55N91, 55P41, 55P42, 55P62; 18E30, 19D55, 19L47, 20C99, 55T15, 55T25, **Individual member $36**, List $60, Institutional member $48, Order code MEMO/138/661N



Differential and Symplectic Topology of Knots and Curves

S. Tabachnikov, *University of Arkansas, Fayetteville*, Editor

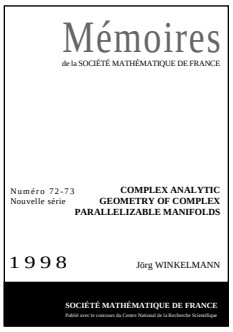
This book presents a collection of papers on two related topics: topology of knots and knot-like objects (such as curves on surfaces) and topology of Legendrian knots and links in 3-dimensional contact manifolds.

Featured is the work of international experts in knot theory ("quantum" knot invariants, knot invariants of finite type), in symplectic and contact topology, and in singularity theory. The interplay of diverse methods from these fields makes this volume unique in the study of Legendrian knots and knot-like objects such as wave fronts. A particularly enticing feature of the volume is its international significance. The volume successfully embodies a fine collaborative effort by worldwide experts from Belgium, France, Germany, Israel, Japan, Poland, Russia, Sweden, the U.K., and the U.S.

Contents: J. C. Álvarez Paiva, Contact topology, taut immersions, and Hilbert's fourth problem; **E. Ferrand**, On Legendre cobordisms; **V. Goryunov**, Vassiliev invariants of knots in $\mathbb{R}^3$ and in a solid torus; **T. Januszkiewicz** and **J. Świątkowski**, Finite type invariants of generic immersions of M^n into $\mathbb{R}^{2n}$ are trivial; **S. K. Lando**, On enumeration of unicursal curves; **A. B. Merkov**, Vassiliev invariants classify flat braids; **M. Polyak**, New Whitney-type formulas for plane curves; **B. Shapiro**, Tree-like curves and their number of inflection points; **S. Tabachnikov**, Geometry of exact transverse line fields and projective billiards; **V. Tchernov**, Shadows of wave fronts and Arnold-Bennequin type invariants of fronts on surfaces and orbifolds; **M. Umehara**, A unified approach to the four vertex theorems. I; **G. Thorbergsson** and **M. Umehara**, A unified approach to the four vertex theorems. II; **V. A. Vassiliev**, Topology of two-connected graphs and homology of spaces of knots.

American Mathematical Society Translations—Series 2 (*Advances in the Mathematical Sciences*), Volume 190

March 1999, approximately 289 pages, Hardcover, ISBN 0-8218-1354-4, 1991 *Mathematics Subject Classification*: 57Gxx; 53Cxx, **Individual member $59**, List $99, Institutional member $79, Order code TRANS2/190N



Complex Analytic Geometry of Complex Parallelizable Manifolds

Jörg Winkelmann, *Ruhr-Universität Bochum, Germany*

A publication of Société Mathématique de France.

In this work, the author examines complex parallellizable manifolds, i.e., complex manifolds arising as quotients of complex Lie groups by discrete subgroups. Special emphasis is put on quotients by discrete subgroups which are co-compact or at least of finite co-volume.

These quotient manifolds are studied from a complex-analytic point of view. Topics considered include submanifolds, vector bundles, cohomology, deformations, maps and functions. Furthermore, arithmeticity results for compact complex nilmanifolds are deduced.

To improve accessibility, an exposition of basic results on lattices in complex Lie groups is also included.

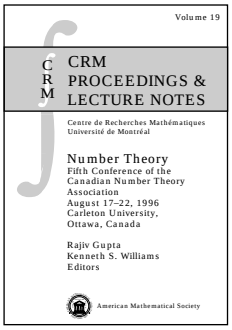
Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a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

Contents: Introduction; Arithmetic groups; Closed orbits and density results; Subvarieties; Holomorphic mappings; Vector bundles; Flat bundles; Deformations and cohomology; On the structure of complex nilmanifolds; Holomorphic functions on an algebraic group invariant under a Zariski dense subgroup; Density properties: Overview; Bibliography; Index.

Memoires de la Société Mathématique de France, Number 72, Number 73

October 1998, 219 pages, Softcover, ISBN 2-85629-070-1, 1991 *Mathematics Subject Classification*: 22E40, 32M10; 14E09, 14L30, 14K22, 20G20, 32C10, 32G05, 32H02, 32J99, 57S30, **Individual member $50**, List $55, Order code SMFMEM/72/73N

Number Theory



Number Theory

Fifth Conference of the Canadian Number Theory Association

Rajiv Gupta, *University of British Columbia, Vancouver, Canada*, and **Kenneth S. Williams**, *Carleton University, Ottawa, ON, Canada*, Editors

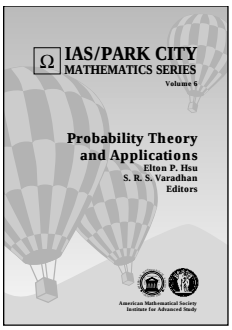
This book contains papers presented at the fifth Canadian Number Theory Association (CNTA) conference held at Carleton University (Ottawa, ON). The invited speakers focused on arithmetic algebraic geometry and elliptic curves, diophantine problems, analytic number theory, and algebraic and computational number theory. The contributed talks represented a wide variety of areas in number theory. David Boyd gave an hour-long talk on "Mahler's Measure and Elliptic Curves". This lecture was open to the public and attracted a large audience from outside the conference.

Contents: A. Baragar, Rational curves with zero self intersection on certain $K3$ surfaces; **B. C. Berndt** and **H. H. Chan**, Notes on Ramanujan's singular moduli; **M.-J. Bertin**, The operator $x+(1/x)-2$ and the reciprocal integers; **F. Beukers**, Integral points on cubic surfaces; **D. A. Buell**, The last exhaustive computation of class groups of complex quadratic number fields; **K.-K. Choi** and **J. D. Vaaler**, Diophantine approximation in projective space; **R. J. Cook**, Bounds for odd perfect numbers; **W. Duke**, Automorphic L-functions in level aspect; **R.-M. Elkenbracht-Huizing**, **P. L. Montgomery**, **R. D. Silverman**, **R. K. Wackerbarth**, and **S. S. Wagstaff, Jr.**, The number field sieve on many computers; **P. Erdős** and **M. R. Murty**, On the order of $a \pmod p$; **C. Friesen**, A special case of Cohen-Lenstra heuristics in function fields; **W. F. Galway**, An asymptotic expansion of Ramanujan; **C. Greither**, Improving Ramachandra's and Levesque's unit index; **S. Gurak**, On the middle factor of the period polynomial for finite fields; **A. Ivić** and **C. Pomerance**, On the distribution of champs; **J. W. Jones** and **D. P. Roberts**, Sextic number fields with discriminant $(-1)^j 2^a 3^b$; **M. Kaneko**, Traces of singular moduli and the Fourier coefficients of the elliptic modular function $j(\tau)$; **P. Kaplan**, Problème d'Eisenstein pour le conducteur 3; **M. Langevin**, Liens entre le théorème de Mason et la conjecture (abc); **X.-J. Li**, On the trace of Hecke operators for Maass forms; **S. Lindhurst**, An analysis of Shanks's algorithm for computing square roots in finite fields; **M.-C. Liu** and **T. Wang**, On the equation $a_1p_1+a_2p_2+a_3p_3=b$ with prime variables in arithmetic progressions; **S. Louboutin** and **R. A. Mollin**, Solutions to $x^2-Dy^2=Q$; **K. Ono** and **K. Soundararajan**, Integers represented by ternary quadratic forms; **P. L. Pacelli**, Some uniformity results following from the Lang conjectures; **Y. N. Petridis**, Fourier coefficients of cusp forms; **A. J. van der Poorten**, Beer and continued fractions with periodic periods; **C. J. Smyth**, An inequality for polynomials; **S. H. Son**, Some integrals of theta functions in Ramanujan's lost notebook; **H. A. Verrill**, Arithmetic of a certain Calabi-Yau threefold; **L. Ya. Vulakh**, Diophantine approximation in Euclidean spaces; **M. Waldschmidt**, Transcendance et indépendance algébrique de valeurs de fonctions modulaires; **S. Wong**, On the rank of ideal class groups; **R. K. Guy**, Conference problems session conducted by J. L. Selfridge; **P. Ribenboim**, Homework!.

CRM Proceedings & Lecture Notes, Volume 19

April 1999, 392 pages, Softcover, ISBN 0-8218-0964-4, 1991 *Mathematics Subject Classification*: 11–06, **Individual member $66**, List $110, Institutional member $88, Order code CRMP/19N

Probability



Probability Theory and Applications

Elton P. Hsu, *Northwestern University, Evanston, IL*, and **S. R. S. Varadhan**, *Courant Institute, New York University, NY*, Editors

This volume, with contributions by leading experts in the field, is a collection of lecture notes of the six minicourses given at the IAS/Park City Summer Mathematics Institute. It introduces advanced graduates and researchers in probability theory to several of the currently active research areas in the field. Each course is self-contained with references and contains basic materials and recent results. Topics include interacting particle systems, percolation theory, analysis on path and loop spaces, and mathematical finance.

The volume gives a balanced overview of the current status of probability theory. An extensive bibliography for further study and research is included. This unique collection presents several important areas of current research and a valuable survey reflecting the diversity of the field.

Members of the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM) receive a 20% discount from list price.

Contents: *R. Durrett, Stochastic Spatial Models:* Introduction; The voter model; Coalescing random walks; Voter model with mutation; The block construction; Long range limits; Rapid stirring limits; Bibliography; *J. T. Chayes, A. L. Puha, and T. Sweet, Independent and Dependent Percolation:* Preface; The basics of percolation; Rescaling and finite-size scaling in percolation; Critical exponent inequalities; Two fundamental questions; Finite-size scaling and the incipient infinite cluster; The BK(R) inequality; The Potts model and the random cluster model; Bibliography; *L. Jensen and H.-T. Yau, Hydrodynamical Scaling Limits of Simple Exclusion Models:* Introduction; The simple exclusion model; Proof of Theorem 1.4; Local ergodicity; Two-block estimate; Relative entropy; The Green-Kubo formula and asymmetric simple exclusion processes; Some open problems; Bibliography; *D. W. Stroock, An Introduction to Analysis on Path Space:* Introduction; Gaussian measures on a Hilbert space; Rolling on; About $\mathcal{W}_M$; A few facts, and something else; Bibliography; *E. P. Hsu, Analysis on Path and Loop Spaces:* Introduction; Euclidean Brownian motion; Gradient operator; Ornstein-Uhlenbeck operator; Brownian motion on manifolds; Gradient formulas; Integration by parts; Logarithmic Sobolev inequalities; Bibliographical comments; Bibliography; *M. Avellaneda, An Introduction to Option Pricing and the Mathematical Theory of Risk:* Bibliography.

IAS/Park City Mathematics Series, Volume 6

March 1999, 374 pages, Hardcover, ISBN 0-8218-0590-8, LC 98-51767, 1991 *Mathematics Subject Classification*: 60–01, 60–02, **All AMS members $45**, List $56, Order code PCMS/6N

Previously Announced Publications

Monge Ampère Equation: Applications to Geometry and Optimization

Luis A. Caffarelli, *New York University, Courant Institute*, and **Mario Milman**, *Florida Atlantic University, Boca Raton*, Editors

In recent years, the Monge Ampère Equation has received attention for its role in several new areas of applied mathematics:
- As a new method of discretization for evolution equations of classical mechanics, such as the Euler equation, flow in porous media, Hele-Shaw flow, etc.,
- As a simple model for optimal transportation and a div-curl decomposition with affine invariance and
- As a model for front formation in meteorology and optimal antenna design.

These applications were addressed and important theoretical advances presented at a NSF-CBMS conference held at Florida Atlantic University (Boca Raton). L. Cafarelli and other distinguished specialists contributed high-quality research results and up-to-date developments in the field. This is a comprehensive volume outlining current directions in nonlinear analysis and its applications.

Contents: J.-D. Benamou and **Y. Brenier**, A numerical method for the optimal time-continuous mass transport problem and related problems; **L. A. Caffarelli**, **S. A. Kochengin**, and **V. I. Oliker**, On the numerical solution of the problem of reflector design with given far-field scattering data; **M. J. P. Cullen** and **R. J. Douglas**, Applications of the Monge-Ampére equation and Monge transport problem to meterology and oceanography; **M. Feldman**, Growth of a sandpile around an obstacle; **W. Gangbo**, The Monge mass transfer problem and its applications; **B. Guan**, Gradient estimates for solutions of nonparametric curvature evolution with prescribed contact angle condition; **L. G. Hanin**, An extension of the Kantorovich norm; **M. McAsey** and **L. Mou**, Optimal locations and the mass transport problem; **E. Newman** and **L. P. Cook**, A generalized Monge-Ampére equation arising in compressible flow; **J. Urbas**, Self-similar solutions of Gauss curvature flows.

Contemporary Mathematics, Volume 226

October 1998, 172 pages, Softcover, ISBN 0-8218-0917-2, LC 98-38822, 1991 *Mathematics Subject Classification*: 35J60, 35B65, 35A30, 46N10, 49Q20, 58E12, **Individual member $23**, List $39, Institutional member $31, Order code CONM/226RT93

Recommended Text

Mirror Symmetry and Algebraic Geometry

David A. Cox, *Amherst College, MA*, and **Sheldon Katz**, *Oklahoma State University, Stillwater*

Mirror symmetry began when theoretical physicists made some astonishing predictions about rational curves on quintic hypersurfaces in four-dimensional projective space. Understanding the mathematics behind these predictions has been a substantial challenge. This book is the first completely comprehensive monograph on mirror symmetry, covering the original observations by the physicists through the most recent progress made to date. Subjects discussed include toric varieties, Hodge theory, Kähler geometry, moduli of stable maps, Calabi-Yau manifolds, quantum cohomology, Gromov-Witten invariants, and the mirror theorem.

Features:
- Numerous examples worked out in detail
- An appendix on mathematical physics
- An exposition of the algebraic theory of Gromov-Witten invariants and quantum cohomology
- A proof of the mirror theorem for the quintic threefold

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

Mathematical Surveys and Monographs, Volume 68

March 1999, 467 pages, Hardcover, ISBN 0-8218-1059-6, 1991 *Mathematics Subject Classification*: 14–02; 81–02, **All AMS members $55**, List $69, Order code SURV/68RT93

Mirror Symmetry III

Duong H. Phong, *Columbia University, New York*, **Luc Vinet**, *University of Montreal, PQ, Canada*, and **Shing-Tung Yau**, *Harvard University, Cambridge, MA*, Editors

This book presents surveys from a workshop held during the theme year in geometry and topology at the Centre de recherches mathématiques (CRM, University of Montréal). The volume is in some sense a sequel to *Mirror Symmetry I* (1998) and *Mirror Symmetry II* (1996), co-published by the AMS and International Press.

Included are recent developments in the theory of mirror manifolds and the related areas of complex and symplectic geometry. The long introductory articles explain the key physical ideas and motivation, namely conformal field theory, supersymmetry, and string theory. Open problems are emphasized. Thus the book provides an efficient way for a very broad audience of mathematicians and physicists to reach the frontier of research in this fast expanding area.

Features:
- Crucial research pertaining to future developments in algebraic and symplectic geometry and to the physics of unified string theories
- Well-known authors who are leaders in the field
- Introductory article by Greene and Yau
- A solid and even blend of ideas and techniques from both mathematics and physics

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

This book is co-published by the AMS, International Press, and Centre de Recherches Mathématiques.

Contents: B. R. Greene, Aspects of quantum geometry; **S.-T. Yau**, Introduction to enumerative invariants; **T. H. Parker**, Compactified moduli spaces of pseudo-holomorphic curves; **M. Verbitsky**, Mirror symmetry for hyper-Kähler manifolds; **M. Gross**, Connecting the web: A prognosis; **A. Klemm** and **P. Mayr**, Strong coupling singularities and non-abelian gauge symmetries in $N = 2$ string theory; **S. Kachru**, Remarks on (0,2) Calabi-Yau models; **K. Liu**, Relations among fixed point; **J. Jorgenson** and **A. Todorov**, An analytic discriminant for polarized algebraic $K3$ surfaces; **D. R. Morrison**, Through the looking glass; **B. Siebert**, An update on (small) quantum cohomology.

AMS/IP Studies in Advanced Mathematics, Volume 10

January 1999, 312 pages, Hardcover, ISBN 0-8218-1193-2, LC 98-37643, 1991 *Mathematics Subject Classification*: 14–06; 32–06, 81–06, **All AMS members $34**, List $42, Order code AMSIP/10RT93

AMS Video

Introduction to Geometric Probability

Gian-Carlo Rota, *Massachusetts Institute of Technology, Cambridge*

This lecture examines the notion of invariant measure from a fresh viewpoint. The most familiar examples of invariant measures are area and volume, which are invariant under the group of rigid motions. Master expositor Gian-Carlo Rota shows how, starting with a few simple axioms, one can concoct new invariant measures and explore their properties. One set of such measures, known as the intrinsic volumes, are quite new and still somewhat mysterious. However, they have intriguing probabilistic interpretations and in fact can be shown to form a basis for the space of all continuous invariant measures. Rota also discusses the remarkable connection between the intrinsic volumes and the Euler characteristic. Reaching deep ideas while remaining at an elementary level, this lecture would be accessible to undergraduate mathematics majors.

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

November 1998, NTSC format on one-half inch VHS videotape, approximately 60 minutes, ISBN 0-8218-1351-X, 1991 *Mathematics Subject Classification*: 52, 60, **Individual member $34.95**, List $54.95, Institutional member $44.95, Order code VIDEO/102RT93

Multichannel Optical Networks: Theory and Practice

Peng-Jun Wan, *Illinois Institute of Technology, Chicago*, **Ding-Zhu Du**, *University of Minnesota, Minneapolis*, and **Panos M. Pardalos**, *University of Florida, Gainesville*, Editors

Time division multiplexing (TDM) has been the fundamental basis for adding capacity to digital telecommunications networks for decades. However, within the past two years, wavelength division multiplexing (WDM) has been emerging as an important and widely deployed complement to TDM. Sales of systems based on the new technology have risen at breathtaking speed. The driving force behind this sales explosion was the unexpected rapid exhaustion of long distance fiber network capacity. This fiber exhaust, combined with favorable economics for WDM, led to the use of this technology over other alternatives.

The WDM deployment raises fundamental and challenging problems that require novel and innovative solutions. This volume presents papers from an interdisciplinary workshop held at DIMACS on multichannel optical networks. Leading computer science theorists and practitioners discussed admissions control, routing and channel assignment, multicasting and protection, and fault-tolerance. The book features application of theoretical and/or algorithmical results to practical problems and addresses the influence of practical problems to theoretical/algorithmic studies. The volume can serve as a text for an advanced course in computer science, networking, and operations research.

Contents: V. Auletta, **I. Caragiannis**, **C. Kaklamanis**, and **P. Persiano**, Efficient wavelength routing in trees with low-degree converters; **P.-J. Wan** and **L. Liu**, Maximal throughput in wavelength-routed optical networks; **O. Gerstel**, Minimizing the cost of an optical network; **V. Kumar**, Bandwidth allocation algorithms for tree and ring networks; **K. Sivalingam**, **J. Wang**, **X. Wu**, and **M. Mishra**, Improved on-line scheduling algorithms for optical WDM networks; **B. Beauquier**, Broadcasting in WDM optical rings and tori; **E. J. Harder** and **H.-A. Choi**, Gossiping in WDM all-optical square mesh networks; **C. Zhou** and **Y. Yang**, On the number of wavelengths required to embed multicast assignments in WDM networks; **D. S. Kim**, **D.-Z. Du**, and **P. M. Pardalos**, On conflict-free channel set assignments for optical cluster-based hypercube networks; **S. Ramamurthy** and **B. Mukherjee**, Fault-tolerant design of wavelength-routed optical networks; **O. Crochat**, **J.-Y. Le Boudec**, and **O. Gerstel**, Protection interoperability for WDM optical networks; **J. Skorin-Kapov** and **J.-F. Labourdette**, On minimum congestion routing in broadcast optical networks with regular and arbitrary topologies; **C. Qiao**, **Y. Mei**, **M. Yoo**, and **X. Zhang**, Polymorphic control for cost-effective design of optical networks; **C.-C. Yu**, **S. Bhattacharya**, and **P. Shen**, Adaptive cycle time for real-time TWDM: Tool and performance analysis; **F. Siu** and **R. K. C. Chang**, Optimal node assignment in reconfigurable WDM lightwave networks with regular virtual topologies; **I. Chlamtac**, **A. Fumagalli**, and **V. Elek**, Performance of photonic slot routing networks; **R. Bartoš**, **P. De La Torre**, and **R. Kannan**, Space-time-wavelength network with group communication locality.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 46

January 1999, 249 pages, Hardcover, ISBN 0-8218-1004-9, LC 98-44528, 1991 *Mathematics Subject Classification*: 03B05, 90A05, 68T15, 68Q25, 68Q42, 68R10, 90C27, 90C30, 90B40, 68T01, 68Q15; 68Q22, 68Q25, 68P10, **Individual member $33**, List $55, Institutional member $44, Order code DIMACS/46RT93

Selections from MSRI's Video Archive, Volume 2

The Chern Symposium, March 5–7, 1998

A publication of MSRI.

This CD-ROM features video presentations from the Chern symposium in geometry sponsored jointly by the University of CA (Berkeley) and MSRI. The symposium presented developments in differential geometry over the past few decades. Recent progress and new directions in the field were also covered.

The CD requires Real™Video Player, which can be downloaded for free from the RealNetworks Internet home page. RealVideo Player is available for Windows95/Windows NT, Windows 3.1, MacOS, IRIX 6.2/6.3, Solaris 2.5 and Linux 2.0.

Distributed worldwide by the American Mathematical Society.

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Contents: J. Simons, Introductory remarks; **R. Bott**, Configuration space invariants of knots and 3-manifolds; **R. Bryant**, Finsler manifolds of constant flag curvature; **Xiu-Xiong Chern**, Extremal metrics in Riemann surfaces and the uniformization theorem; **S. S. Chern**, Projective geometry; **F. Hirzebruch**, Why do I like Chern classes?; **B. Lawson**, Algebraic cycles and the classical groups; **K. Liu**, Mirror principle; **E. Meinrenken**, Duistermaat-Heckman formulas for group valued moment maps; **C.-L. Terng**, Backlund transformations and loop ground actions; **A. Weinstein**, From Riemann geometry to Poisson geometry and back again.

Selections From MSRI's Video Archive

July 1998, CD-ROM, 1991 *Mathematics Subject Classification*: 53, List $15, Order code MSRICD/2RT93