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## Analysis



## Unfolding CR Singularities

## Adam Coffman, Indiana

 University-Purdue University at Fort Wayne, INContents: Unfolding CR singularities: Introduction; Topological considerations; Local defining equations and transformations; A complexification construction; Real surfaces in $\mathbb{C}^{2}$; Real $m$-submanifolds in $\mathbb{C}^{n}, m<n$; Rapid convergence proof of the main theorem; Some other directions; Bibliography.
Memoirs of the American Mathematical Society, Volume 205, Number 962

April 2010, 90 pages, Softcover, ISBN: 978-0-8218-4657-5, LC 2010003516, 2000 Mathematics Subject Classification: 32V40, 32S30, 58K35, Individual member US\$40, List US\$67, Institutional member US\$54, Order code MEMO/205/962


## Banach Algebras on Semigroups and on Their Compactifications

H. G. Dales, University of Leeds, England, A. T.-M. Lau, University of Alberta, Edmonton, $A B$, Canada, and D. Strauss, University of Leeds, England

Contents: Introduction; Banach algebras and their second duals; Semigroups; Semigroup algebras; Stone-Čech compactifications; The semigroup ( $\beta S, \square$ ); Second duals of semigroup algebras; Related spaces and compactifications; Amenability for semigroups; Amenability of semigroup algebras; Amenability and weak amenability for certain Banach algebras; Topological centres; Open problems; Bibliography; Index of terms; Index of symbols.

Memoirs of the American Mathematical Society, Volume 205, Number 966
April 2010, 165 pages, Softcover, ISBN: 978-0-8218-4775-6, LC 2010003552, 2000 Mathematics Subject Classification: 43A10, 43A20; 46J10, Individual member US\$44, List US\$74, Institutional member US\$59, Order code MEMO/205/966


# On a Conjecture of E. M. Stein on the Hilbert Transform on Vector Fields 

Michael Lacey, Georgia Institute of Technology, Atlanta, GA, and Xiaochun Li, University of Illinois, Urbana, IL

Contents: Overview of principal results; Besicovitch set and Carleson's theorem; The Lipschitz Kakeya maximal function; The $L^{2}$ estimate; Almost orthogonality between annuli.

Memoirs of the American Mathematical Society, Volume 205, Number 965

April 2010, 72 pages, Softcover, ISBN: 978-0-8218-4540-0, LC 2010003519, 2000 Mathematics Subject Classification: 42A50, 42B25, Individual member US\$38, List US\$64, Institutional member US\$51, Order code MEMO/205/965


> Nonlinear Analysis and Optimization I Nonlinear Analysis

> Arie Leizarowitz, TechnionIsrael Institute of Technology, Haifa, Israel, Boris S. Mordukhovich, Wayne State University, Detroit, MI, and Itai Shafrir and Alexander J. Zaslavski, Technion-Israel Institute of Technology, Haifa, Israel, Editors

This volume is the first of two volumes representing leading themes of current research in nonlinear analysis and optimization. The articles are written by prominent researchers in these two areas and bring the readers, advanced graduate students and researchers alike, to the frontline of the vigorous research in these important fields of mathematics.
This volume contains articles on nonlinear analysis. Topics covered include the convex feasibility problem, fixed point theory, mathematical biology, Mosco stability, nonexpansive mapping theory, nonlinear partial differential equations, optimal control, the proximal point algorithm and semigroup theory. The companion volume (Contemporary Mathematics, Volume 514) is devoted to optimization.
This item will also be of interest to those working in applications.
This book is co-published with Bar-Ilan University (Ramat-Gan, Israel).
Contents: A. S. Ackleh, K. Deng, and Q. Huang, Existenceuniqueness results and difference approximations for an amphibian juvenile-adult model; S. Aizicovici, N. S. Papageorgiou, and V. Staicu, Three nontrivial solutions for $p$-Laplacian Neumann problems with a concave nonlinearity near the origin; V. Barbu, Optimal stabilizable feedback controller for Navier-Stokes equations; H. H. Bauschke and X. Wang, Firmly nonexpansive and Kirszbraun-Valentine extensions: A constructive approach via monotone operator theory; R. E. Bruck, On the random product of orthogonal projections in Hilbert space II; D. Butnariu, E. Resmerita, and S. Sabach, A Mosco stability theorem for the generalized proximal mapping; A. Cegielski, Generalized relaxations of nonexpansive operators and convex feasibility problems; Y. Censor and A. Segal, Sparse string-averaging and split common fixed points; T. Domínguez Benavides and S. Phothi, Genericity of the fixed point property for reflexive spaces under renormings; K. Goebel and B. Sims, Mean Lipschitzian mappings; T. Ibaraki and $\mathbf{W}$. Takahashi, Generalized nonexpansive mappings and a proximal-type algorithm in Banach spaces; W. Kaczor,
T. Kuczumow, and N. Michalska, The common fixed point set of commuting nonexpansive mapping in Cartesian products of weakly compact convex sets; L. Leuştean, Nonexpansive iterations in uniformly convex $W$-hyperbolic spaces; G. López, V. Martín-Marquez, and H.-K. Xu, Halpern's iteration for nonexpansive mappings; J. W. Neuberger, Lie generators for local semigroups; H.-K. Xu, An alternative regularization method for nonexpansive mappings with applications.
Contemporary Mathematics, Volume 513
June 2010, approximately 276 pages, Softcover, ISBN: 978-0-8218-
4834-0, LC 2009051904, 2000 Mathematics Subject Classification:

03-XX, 11-XX, 14-XX, 20-XX, 26-XX, 30-XX, 34-XX, 35-XX, 39-XX, 41-XX, 46-XX, 47-XX, 49-XX, 52-XX, 54-XX, 55-XX, 57-XX, 58-XX, 65-XX, 76-XX, 90-XX, AMS members US\$71, List US\$89, Order code CONM/513


# Nonlinear Analysis and Optimization II <br> <br> Optimization 

 <br> <br> Optimization}

Arie Leizarowitz, TechnionIsrael Institute of Technology, Haifa, Israel, Boris S. Mordukhovich, Wayne State University, Detroit, MI, and Itai Shafrir and Alexander J. Zaslavski, Technion-Israel Institute of Technology, Haifa, Israel, Editors

This volume is the second of two volumes representing leading themes of current research in nonlinear analysis and optimization. The articles are written by prominent researchers in these two areas and bring the readers, advanced graduate students and researchers alike, to the frontline of the vigorous research in important fields of mathematics.
This volume contains articles on optimization. Topics covered include the calculus of variations, constrained optimization problems, mathematical economics, metric regularity, nonsmooth analysis, optimal control, subdifferential calculus, time scales and transportation traffic. The companion volume (Contemporary Mathematics, Volume 513) is devoted to nonlinear analysis.
This item will also be of interest to those working in applications.
This book is co-published with Bar-Ilan University (Ramat-Gan, Israel).
Contents: J.-P. Aubin and S. Martin, Travel time tubes regulating transportation traffic; R. Baier and E. Farkhi, The directed subdifferential of DC functions; Z. Balanov, W. Krawcewicz, and H. Ruan, Periodic solutions to $O(2)$-symmetric variational problems: $O(2) \times S^{1}$ - equivariant gradient degree approach; J. F. Bonnans and N. P. Osmolovskii, Quadratic growth conditions in optimal control problems; J. M. Borwein and S. Sciffer, An explicit non-expansive function whose subdifferential is the entire dual ball; G. Buttazzo and G. Carlier, Optimal spatial pricing strategies with transportation costs; R. A. C. Ferreira and D. F. M. Torres, Isoperimetric problems of the calculus of variations on time scales; M. Foss and N. Randriampiry, Some two-dimensional $\mathcal{A}$-quasiaffine functions; F. Giannessi, A. Moldovan, and L. Pellegrini, Metric regular maps and regularity for constrained extremum problems; V. Y. Glizer, Linear-quadratic optimal control problem for singularly perturbed systems with small delays; T. Maruyama, Existence of periodic solutions for Kaldorian business fluctuations; D. Mozyrska and E. Pawłuszewicz, Delta and nabla monomials and generalized polynomial series on time scales; D. Pallaschke and R. Urbański, Morse indexes for piecewise linear functions; J.-P. Penot, Error bounds, calmness and their applications in nonsmooth analysis; F. Rampazzo, Commutativity of control vector fields and "inf-commutativity"; A. J. Zaslavski, Stability of exact penalty for classes of constrained minimization problems in finite-dimensional spaces.
Contemporary Mathematics, Volume 514

June 2010, approximately 298 pages, Softcover, ISBN: 978-0-8218-4835-7, LC 2009051904, 2000 Mathematics Subject Classification: 03-XX, 11-XX, 14-XX, 20-XX, 26-XX, 30-XX, 34-XX, 35-XX, 39-XX, 41-XX, 46-XX, 47-XX, 49-XX, 52-XX, 54-XX, 55-XX, 57-XX, 58-XX, 65-XX, 76-XX, 90-XX, AMS members US\$71, List US\$89, Order code CONM/514


> Approximate Homotopy of Homomorphisms from $C(X)$ into a Simple $C^{*}$-Algebra

Huaxin Lin, University of Oregon, Eugene, OR

Contents: Prelude; The basic homotopy lemma for higher dimensional spaces; Purely infinite simple $C^{*}$-algebras; Approximate homotopy; Super homotopy; Postlude; Bibliography.
Memoirs of the American Mathematical Society, Volume 205, Number 963
April 2010, 131 pages, Softcover, ISBN: 978-0-8218-5194-4, LC 2010003517, 2000 Mathematics Subject Classification: 46L05, 46L35, Individual member US\$41, List US\$69, Institutional member US\$55, Order code MEMO/205/963


> Hilbert Spaces of Analytic Functions

> Javad Mashreghi and Thomas Ransford, Université Laval, Montréal, QC, Canada, and Kristian Seip, Norwegian University of Science and Technology, Trondheim, Norway, Editors

Hilbert spaces of analytic functions are currently a very active field of complex analysis. The Hardy space is the most senior member of this family. However, other classes of analytic functions such as the classical Bergman space, the Dirichlet space, the de Branges-Rovnyak spaces, and various spaces of entire functions, have been extensively studied. These spaces have been exploited in different fields of mathematics and also in physics and engineering. For example, de Branges used them to solve the Bieberbach conjecture. Modern control theory is another place that heavily exploits the techniques of analytic function theory. This book grew out of a workshop held in December 2008 at the CRM in Montréal and provides an account of the latest developments in the field of analytic function theory.
Titles in this series are co-published with the Centre de Recherches Mathématiques.
Contents: J. A. Ball and V. Bolotnikov, Canonical de Branges-Rovnyak model transfer-function realization for multivariable Schur-class functions; N. Arcozzi, R. Rochberg, and E. Sawyer, Two variations on the Drury-Averson space; S. R. Garcia and W. T. Ross, The norm of a truncated Toeplitz operator;
A. Boivin and C. Zhu, Approximation in weighted Hardy spaces for the unit disc; R. G. Douglas and J. Sarkar, Some remarks on the Toeplitz corona problem; E. Fricain and A. Hartmann, Regularity on the boundary in spaces of holomorphic functions on the unit disk; D. Khavinson and E. Lundberg, The search for singularities of solutions to the Dirichlet problem: Recent developments;
O. El-Fallah, K. Kellay, and T. Ransford, Invariant subspaces of the Dirichlet space; J. Mashreghi, T. Ransford, and M. Shabankhah, Arguments of zero sets in the Dirichlet space; J. Zemánek, Questions on Volterra operators; D.-C. Chang, G. Dafni, and H. Yue, Nonhomogeneous div-curl decompositions for local Hardy spaces on a domain; R. Fournier and S. Ruscheweyh, On the Bohr radius for simply connected plane domains; A. Boivin and C. Zhu, Completeness of the system $\left\{f\left(\lambda_{n} z\right)\right\}$ in $L_{a}^{2}[\Omega]$; J. Mashreghi, A formula for the logarithmic derivative and its applications; H. Wulan and C. Xiong, Composition operators on the minimal Möbius invariant space; P. M. Gauthier, Whether regularity is local for the generalized Dirichlet problem.

## CRM Proceedings \& Lecture Notes, Volume 51

May 2010, 214 pages, Softcover, ISBN: 978-0-8218-4879-1, 2000 Mathematics Subject Classification: 46E20, 46E22, 47B32, 31C25, AMS members US\$79, List US\$99, Order code CRMP/51


# Operator Theory on Noncommutative Domains 

## Gelu Popescu, University of Texas at San Antonio, TX

Contents: Introduction; Operator algebras associated with noncommutative domains; Free holomorphic functions on noncommutative domains; Model theory and unitary invariants on noncommutative domains; Commutant lifting and applications; Bibliography.
Memoirs of the American Mathematical Society, Volume 205, Number 964

April 2010, 124 pages, Softcover, ISBN: 978-0-8218-4710-7, LC 2010003518, 2000 Mathematics Subject Classification: 47A05, 47A56, 47A20, 46E40; 46L52, 46L07, 47A67, 47A63, 47A57, 47A60, Individual member US\$41, List US\$69, Institutional member US\$55, Order code MEMO/205/964

## Applications



# An Introductory Course on Mathematical Game Theory 

Julio González-Díaz, Universidade de Santiago de Compostela, Spain, Ignacio García-Jurado, Universidade da Coruña, Spain, and M. Gloria Fiestras-Janeiro, Universidade de Vigo, Spain

Game theory provides a mathematical setting for analyzing competition and cooperation in interactive situations. The theory has been famously applied in economics, but is relevant in many other sciences, such as political science, biology, and, more recently, computer science. This book presents an introductory and up-to-date course on game theory addressed to mathematicians and economists, and to other scientists having a basic mathematical background. The book is self-contained, providing a formal description of the classic game-theoretic concepts together with rigorous proofs of the main results in the field. The theory is illustrated through abundant examples, applications, and exercises.
The style is distinctively concise, while offering motivations and interpretations of the theory to make the book accessible to a wide readership. The basic concepts and results of game theory are given a formal treatment, and the mathematical tools necessary to develop them are carefully presented. Cooperative games are explained in detail, with bargaining and TU-games being treated as part of a general framework. The authors stress the relation between game theory and operations research.
The book is suitable for a graduate or an advanced undergraduate course on game theory.
Contents: Introduction to decision theory; Strategic games; Extensive games; Games with incomplete information; Cooperative games; Bibliography; Notations; Index of authors; Index of solution concepts; Subject index.
Graduate Studies in Mathematics, Volume 115
June 2010, 324 pages, Hardcover, ISBN: 978-0-8218-5151-7, LC 2010000501, 2000 Mathematics Subject Classification: 91-01; 90C05, 05C57, AMS members US\$50, List US\$62, Order code GSM/115

## Differential Equations



# Nonlinear Partial Differential Equations and Related Topics 

Dedicated to Nina N. Uraltseva

Arina A. Arkhipova and Alexander I. Nazarov, St. Petersburg State University, Russia, Editors

This book contains papers that engage a wide set of classical and modern topics in partial differential equations, including linear and nonlinear equations, variational problems, the Navier-Stokes system, and the Boltzmann equation. The results include existence and uniqueness theorems, qualitative properties of solutions, a priori estimates, and nonexistence theorems.
Contents: J. Andersson, H. Shahgholian, and G. S. Weiss, Regularity below the $C^{2}$ threshold for a torsion problem, based on regularity for Hamilton-Jacobi equations; A. Arkhipova, Signorini-type problem in $\mathbb{R}^{N}$ for a class of quadratic functionals; M. Bildhauer and M. Fuchs, A 2D-invariant of a theorem of Uraltseva and Urdaletova for higher order variational problems; M. Bostan, I. M. Gamba, and T. Goudon, The linear Boltzmann equation with space periodic electric field; L. Caffarelli and L. Silvestre, Smooth approximations of solutions to nonconvex fully nonlinear elliptic equations; P. Constantin and G. Seregin, Hölder continuity of solutions of 2D Navier-Stokes equations with singular forcing; M. Giaquinta, P. Mariano, G. Modica, and D. Mucci, Currents and curvature varifolds in continuum mechanics; N. M. Ivochkina, On classic solvability of the $m$-Hessian evolution equation; $\mathbf{N}$. V. Krylov, About an example of $\mathrm{N} . \mathrm{N}$. Ural'tseva and weak uniqueness for elliptic operators; V. Maz'ya and R. McOwen, On the fundamental solution of an elliptic equation in nondivergence form; G. Mingione, Boundary regularity for vectorial problems; A. Nazarov and A. Reznikov, Attainability of infima in the critical Sobolev trace embedding theorem on manifolds; M. V. Safonov, Non-divergence elliptic equations of second order with unbounded drift; V. V. Zhikov and S. E. Pastukhova, Global solvability of Navier-Stokes equations for a nonhomogeneous non-Newtonian fluid.
American Mathematical Society Translations-Series 2 (Advances in the Mathematical Sciences), Volume 229
June 2010, approximately 257 pages, Hardcover, ISBN: 978-0-8218-4997-2, 2000 Mathematics Subject Classification: 35-06, 35F20, 35G20, 35J60, 35K55, 35Q30, 35J15, 35J20, 35J50, AMS members US\$95, List US\$119, Order code TRANS2/229


# Ricci Flow and Geometrization of 3-Manifolds 

John W. Morgan, Stony Brook University, NY, and Frederick Tsz-Ho Fong, Stanford University, CA

This book is based on lectures given at Stanford University in 2009. The purpose
of the lectures and of the book is to give an introductory overview of how to use Ricci flow and Ricci flow with surgery to establish the Poincaré Conjecture and the more general Geometrization Conjecture for 3 -dimensional manifolds. Most of the material is geometric and analytic in nature; a crucial ingredient is understanding singularity development for 3-dimensional Ricci flows and for 3-dimensional Ricci flows with surgery. This understanding is crucial for extending Ricci flows with surgery so that they are defined for all positive time. Once this result is in place, one must study the nature of the time-slices as the time goes to infinity in order to deduce the topological consequences.
The goal of the authors is to present the major geometric and analytic results and themes of the subject without weighing down the presentation with too many details. This book can be read as an introduction to more complete treatments of the same material.
Contents: Overview: Lecture 1; Lecture 2; Lecture 3; Lecture 4; Lecture 5; Summary of Part 1; Non-collapsing results for Ricci flows: Lecture 6; Lecture 7; Lecture 8; Lecture 9; Lecture 10; Lecture 11; Lecture 12; $\kappa$-solutions: Lecture 13; Lecture 14; Lecture 15; Lecture 16; Lecture 17; Lecture 18; Lecture 19; The canonical neighborhood theorem:Lecture 20; Lecture 21; Lecture 22; Ricci flow with surgery: Lecture 23; Lecture 24; Lecture 25; Lecture 26; Behavior as $t \rightarrow \infty$ : Lecture 27; Lecture 28; Lecture 29; Lecture 30; Lecture 31; Lecture 32; Bibliography.

University Lecture Series, Volume 53
May 2010, 150 pages, Softcover, ISBN: 978-0-8218-4963-7, LC 2010003310, 2000 Mathematics Subject Classification: 57M50, 57M40; 35K40, 53C21, AMS members US\$33, List US\$41, Order code ULECT/53

## Discrete Mathematics and Combinatorics



Thirty-three Miniatures
Mathematical and Algorithmic Applications of Linear Algebra

Jiří Matoušek, Charles University, Prague, Czech Republic

This volume contains a collection of clever mathematical applications of linear algebra, mainly in combinatorics, geometry, and algorithms. Each chapter covers a
single main result with motivation and full proof in at most ten pages and can be read independently of all other chapters (with minor exceptions), assuming only a modest background in linear algebra.
The topics include a number of well-known mathematical gems, such as Hamming codes, the matrix-tree theorem, the Lovász bound on the Shannon capacity, and a counterexample to Borsuk's conjecture, as well as other, perhaps less popular but similarly beautiful results, e.g., fast associativity testing, a lemma of Steinitz on ordering vectors, a monotonicity result for integer partitions, or a bound for set pairs via exterior products.
The simpler results in the first part of the book provide ample material to liven up an undergraduate course of linear algebra. The more advanced parts can be used for a graduate course of linear-algebraic methods or for seminar presentations.

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

Contents: Fibonacci numbers, quickly; Fibonacci numbers, the formula; The clubs of Oddtown; Same-size intersections; Error-correcting codes; Odd distances; Are these distances Euclidean?; Packing complete bipartite graphs; Equiangular lines; Where is the triangle?; Checking matrix multiplication; Tiling a rectangle by squares; Three Petersens are not enough; Petersen, Hoffman-Singleton, and maybe 57; Only two distances; Covering a cube minus one vertex; Medium-size intersection is hard to avoid; On the difficulty of reducing the diameter; The end of the small coins; Walking in the yard; Counting spanning trees; In how many ways can a man tile a board?; More bricks-more walls?; Perfect matchings and determinants; Turning a ladder over a finite field; Counting compositions; Is it associative?; The secret agent and umbrella; Shannon capacity of the union: a tale of two fields; Equilateral sets; Cutting cheaply using eigenvectors; Rotating the cube; Set pairs and exterior products; Index.
Student Mathematical Library, Volume 53
June 2010, approximately 171 pages, Softcover, ISBN: 978-0-8218-4977-4, 2000 Mathematics Subject Classification: 05C50, 68Wxx, 15-01, AMS members US\$29, List US\$36, Order code STML/53

Geometry and Topology


# A Celebration of the Mathematical Legacy of Raoul Bott 

P. Robert Kotiuga, Boston University, MA, Editor

A five-day conference celebrating the legacy of Raoul Bott was held at the CRM on June 9-13, 2008. The conference focused on the extraordinary impact Bott had on both topology and interactions between mathematics, physics and technology. The conference was co-organized by the Clay Mathematics Institute and had support from the National Science Foundation (Award 0805925). Montreal was a natural venue for such an event since Raoul Bott obtained two degrees in electrical engineering at McGill University in the 1940s and an honorary doctorate from McGill in 1987. The fact that Bott's presence is still
fresh in the minds of all those involved made for a tremendous amount of enthusiasm and every attempt has been made to channel this energy into this book.
The contributions to this book come from three generations of Bott's students, coauthors, and fellow kindred spirits in order to cover six decades of Bott's research, identify his enduring mathematical legacy and the consequences for emerging fields. The contributions can be read independently. In order to help a whole to emerge from the parts, the book is broken into four sections and to make the book accessible to a wide audience, each section starts with easier-to-read reminiscences and works its way into more involved papers.
Titles in this series are co-published with the Centre de Recherches Mathématiques.
Contents: P. R. Kotiuga, Introduction; Montréal, the 1940s, and mathematical prehistory: C. Bott, My parents' Montréal years and growing up with Raoul as my father; J. Lambek, Raoul Bott, McGill, the 1940s; P. R. Kotiuga, Iron rings, Doctor Honoris Causa Raoul Bott, Carl Herz, and a hidden hand; J. H. Hubbard, The Bott-Duffin synthesis of electrical circuits; Early students and colleagues:
P. D. Lax, F. Hirzebruch, B. Mazur, L. Conlon, E. B. Curtis, H. M. Edwards, J. Huebschmann, and H. Shulman, Raoul Bott as we knew him; M. Atiyah, Working with Raoul Bott: From geometry to physics; H. M. Edwards, The algorithmic side of Riemann's mathematics; M. W. Hirsch, Actions of Lie groups and Lie algebras on manifolds; J. J. Kohn, PDE from the point of view of multiplier ideals; P. Baum, Dirac operator and $K$-theory for discrete groups; J. L. Heitsch, The Lefschetz principle, fixed point theory, and index theory; J. Cantwell and L. Conlon, A new look at the theory of levels; A. Haefliger, On the space of morphisms between Étale groupoids; Localization, equivariance and outgrowths of Morse theory and periodicity: J. A. Bernhard, N. Hingston, J. Stasheff, and V. Guillemin, Raoul Bott as we knew him; N. Hingston, Loop products on connected sums of projective spaces; J. A. Bernhard, Equivariant cohomology and reflections; L. Jeffrey, Connectedness of level sets of the moment map for torus actions on the based loop group; L. W. Tu, Computing characteristic numbers using fixed points; H. Hohnhold, S. Stolz, and P. Teichner, From minimal geodesics to supersymmetric field theories; Dualities and interactions with quantum field theory: C. Vafa, Raoul Bott as my math teacher; S. Lu, A physics colloquium at McGill that changed my life; E. Witten, Geometric Langlands from six dimensions; J. Block, Duality and equivalence of module categories in noncommutative geometry; G. R. Cavalcanti and M. Gualtieri, Generalized complex geometry and T-duality; D. S. Freed, M. J. Hopkins, J. Lurie, and C. Teleman, Topological quantum field theories from compact Lie groups.

## CRM Proceedings \& Lecture Notes, Volume 50

May 2010, 403 pages, Softcover, ISBN: 978-0-8218-4777-0, LC 2010001317, 2000 Mathematics Subject Classification: 01-XX, 18-XX, 19-XX, 35-XX, 55-XX, 57-XX, 58-XX, 81-XX, AMS members US\$100, List US\$125, Order code CRMP/50

# New AMS-Distributed Publications 

## Algebra and Algebraic Geometry



## Représentations des Groupes Réductifs $p$-adiques

David Renard, Ecole<br>Polytechnique, Palaiseau, France


#### Abstract

This book presents a part of the theory of (complex) representations of $p$-adic reductive groups. Starting from fundamentals accessible to graduate


 students, it culminates with the "Bernstein center" theory and the Langlands classification of smooth irreducible representations.This book contains seven chapters. Chapters VI and VII are at the heart of the book. Chapter VI deals with the study of the category of smooth representations of a $p$-adic reductive group and the author establishes, among other things, Bernstein's decomposition theorem and the description of the center. Chapter VII deals with square integrable and temperate representations and contains the proof of Langland's classification theorem.
The first four chapters are more general and deal with: the study of algebras of idempotents, the one of locally compact totally discontinuous spaces and groups, smooth representations of the latter and specific representation classes (compact, unitary, square integrable). Chapter V is a reminder of structural results for reductive $p$-adic groups.
An appendix provides category theory notions necessary for reading this text.
A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30\% discount from list.
Contents: Algèbres à idempotents; Espaces et groupes totalement discontinous; Représentations des groupes totalement discontinous; Représentations compactes, de carré intégrable, unitaires; Structure des groupes réductifs $p$-adiques; Représentations des groupes réductifs $p$-adiques; Classification de Langlands; Éléments de théorie des catégories; Théorème d'Amitsur et corollaires; Algèbre linéaire; Bibliographie.
Cours Spécialisés-Collection SMF, Number 17
January 2010, 332 pages, Hardcover, ISBN: 978-2-85629-278-5, 2000 Mathematics Subject Classification: 22E50, 20G05, Individual member US\$81, List US\$90, Order code COSP/17

## Analysis



## Lectures on the $\mathcal{L}^{2}$-Sobolev Theory of the $\bar{\partial}$-Neumann Problem

Emil J. Straube, Texas A \& M University, College Station, TX

This book provides a thorough and self-contained introduction to the $\bar{\partial}$-Neumann problem, leading up to current research, in the context of the $\mathcal{L}^{2}$-Sobolev theory on bounded pseudoconvex domains in $\mathbb{C}^{n}$. It grew out of courses for advanced graduate students and young researchers given by the author at the Erwin Schrödinger International Institute for Mathematical Physics and at Texas A \& M University.
The introductory chapter provides an overview of the contents and puts them in historical perspective. The second chapter presents the basic $\mathcal{L}^{2}$-theory. Following is a chapter on the subelliptic estimates on strictly pseudoconvex domains. The two final chapters on compactness and on regularity in Sobolev spaces bring the reader to the frontiers of research.
Prerequisites are a solid background in basic complex and functional analysis, including the elementary $\mathcal{L}^{2}$-Sobolev theory and distributions. Some knowledge in several complex variables is helpful. Concerning partial differential equations, not much is assumed. The elliptic regularity of the Dirichlet problem for the Laplacian is quoted a few times, but the ellipticity results needed for elliptic regularization in the third chapter are proved from scratch.
This item will also be of interest to those working in differential equations.
A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.
Contents: Introduction; The $\mathcal{L}^{2}$-theory; Strictly pseudoconvex domains; Compactness; Regularity in Sobolev spaces; Bibliography; Index.
ESI Lectures in Mathematics and Physics, Volume 7
February 2010, 214 pages, Softcover, ISBN: 978-3-03719-076-0, 2000 Mathematics Subject Classification: 32-02, 32W05, 35N15, AMS members US\$45, List US\$56, Order code EMSESILEC/7

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