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**Moody Algebras** - Michael David Weiner - 1998

Bosonic Construction of Vertex Operator Para-Algebras from Symplectic Affine Kac-

Inspired by mathematical structures found by theoretical physicists and by the desire to understand the 'monstrous moonshine' of the Monster group, Borcherds, Frenkel, Lepowsky,
Para-Algebras from Symplectic Affine Kac-operator algebra (VOA). An important part of the theory of VOAs concerns their modules and intertwining operators between modules. Feingold, Frenkel, and Ries defined a structure, called a vertex operator para-algebra (VOPA), where a VOA, its modules and their intertwining operators are unified. In this work, for each $n \geq 1$, the author uses the bosonic construction (from a Weyl algebra) of four level $-1/2$ irreducible representations of the symplectic affine Kac-Moody Lie algebra $C_n^{(1)}$. They define intertwining operators so that the direct sum of the four modules forms a VOPA. This work includes the bosonic analog of the fermionic construction of a vertex operator superalgebra from the four level 1 irreducible modules of type $D_n^{(1)}$ given by Feingold, Frenkel, and Ries. While they get only a VOPA when $n = 4$ using classical triality, the techniques in this work apply to any $n \geq 1$.

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**Spinor Construction of Vertex Operator Algebras, Triality, and E8(1)** - Alex J. Feingold - 1991

The theory of vertex operator algebras is a remarkably rich new mathematical field which captures the algebraic content of conformal field theory in physics. Ideas leading up to this theory appeared in physics as part of statistical mechanics and string theory. In mathematics, the axiomatic definitions crystallized in the work of Borcherds and in *Vertex Operator Algebras and the Monster*, by Frenkel, Lepowsky, and Meurman. The structure of monodromies of intertwining operators for modules of vertex operator algebras yields braid group representations and leads to natural generalizations of vertex operator algebras, such as superalgebras and para-algebras. Many examples of vertex operator algebras and their generalizations are related to constructions in classical representation theory and shed new light on the classical theory. This book accomplishes several goals. The authors provide an explicit spinor construction, using only Clifford algebras, of a vertex operator superalgebra structure on the direct sum of the basic and vector modules for the affine Kac-Moody algebra $D^{(1)}_n$. They also review and extend Chevalley's spinor construction of the 24-dimensional commutative nonassociative algebraic structure and triality on the direct sum of the three 8-dimensional $D_4$-modules. Vertex operator para-algebras, introduced and developed independently in this book and by Dong and Lepowsky, are related to one-dimensional representations of the braid group. The authors also provide a unified approach to the Chevalley, Griess, and $E_8$ algebras and explain some of their similarities. A third goal is
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extension of affine Lie algebra $E^{(1)}_8$, a
natural continuation of previous work on spinor
and oscillator constructions of the classical affine
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extend to include the rest of the exceptional
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develop an inductive technique of construction
which could be applied to the Monster vertex
operator algebra. Directed at mathematicians
and physicists, this book should be accessible to
graduate students with some background in
finite-dimensional Lie algebras and their
representations. Although some experience with
affine Kac-Moody algebras would be useful, a
summary of the relevant parts of that theory is
included. This book shows how the concepts and
techniques of Lie theory can be generalized to
yield the algebraic structures associated with
conformal field theory. The careful reader will
also gain a detailed knowledge of how the spinor
collection of classical triality lifts to the affine

construction of vertex operator algebras,
modules, and intertwining operators with
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Statistical Physics On The Eve Of The 21st Century: In Honour Of J B Mcguire On The Occasion Of His 65th Birthday - Wille Luc T - 1999-02-04
This volume is a collection of original papers and reviews in honour of James McGuire, one of the pioneers of integrable models in statistical physics. The broad range of articles offers a timely perspective on the current status of statistical mechanics, identifying both recent results as well as future challenges. The work contains a number of overviews of standard topics such as exactly solved lattice models and their various applications in statistical physics, from models of strongly correlated electrons to the conformational properties of polymer chains. It is equally wide ranging in its coverage of new directions and developing fields including quantum computers, financial markets, chaotic behaviour, immunology, Markov superposition, Bose-Einstein condensation, random matrices, exclusion statistics, vertex operator algebras and D-unsolvability. The level of coverage is appropriate for graduate students. It will be equally of interest to professional physicists who want to learn about progress in statistical physics in recent years. Experts will find this work useful because of its broad sweep of topics and its discussion of remaining unsolved problems.

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Field Theory - Stephen Berman - 2002

Because of its many applications to mathematics and mathematical physics, the representation theory of infinite-dimensional Lie and quantized enveloping algebras comprises an important area of current research. This volume includes articles from the proceedings of an international conference, "Infinite-Dimensional Lie Theory and Conformal Field Theory", held at the University of Virginia. Many of the contributors to the volume are prominent researchers in the field. This conference provided an opportunity for mathematicians and physicists to interact in an active research area of mutual interest. The talks focused on recent developments in the representation theory of affine, quantum affine, and extended affine Lie algebras and Lie superalgebras. They also highlighted applications to conformal field theory, integrable and disordered systems. Some of the articles are expository and accessible to a broad readership.
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**Vertex Operators in Mathematics and Physics** - J. Lepowsky - 2013-03-08
James Lepowsky t The search for symmetry in nature has for a long time provided representation theory with perhaps its chief motivation. According to the standard approach of Lie theory, one looks for infinitesimal symmetry -- Lie algebras of operators or concrete realizations of abstract Lie algebras. A central theme in this volume is the construction of affine Lie algebras using formal differential operators called vertex operators, which originally appeared in the dual-string theory. Since the precise description of vertex operators, in both mathematical and physical settings, requires a
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A New Construction of Homogeneous Quaternionic Manifolds and Related Geometric Structures - Vicente Cortes - 2000

Let $V = \mathbb{R}^{p,q}$ be the pseudo-Euclidean vector space of signature $(p,q)$, $p \geq 3$ and $W$ a module over the even Clifford algebra $\Cl^0(V)$. A homogeneous quaternionic manifold $(M,Q)$ is constructed for any $\mathfrak{spin}(V)$-equivariant linear map $\Pi : \bigwedge^2 W \to V$. If the skew symmetric vector valued bilinear form $\Pi$ is nondegenerate then $(M,Q)$ is endowed with a canonical pseudo-Riemannian metric $g$ such that $(M,Q,g)$ is a homogeneous quaternionic pseudo-Kahler manifold. If the metric $g$ is positive definite, i.e. a Riemannian metric, then the quaternionic Kahler manifold $(M,Q,g)$ is shown to admit a simply transitive solvable group of automorphisms. In this special case ($p=3$) we recover all the known homogeneous quaternionic Kahler manifolds of negative scalar curvature (Alekseevsky spaces) in a unified and direct way. If $p>3$ then $M$ does not admit any transitive action of a solvable Lie group and we obtain new families of quaternionic pseudo-Kahler manifolds. Then it is shown that for $q = 0$, the noncompact quaternionic manifold $(M,Q)$ can be endowed with a Riemannian metric $h$ such that $(M,Q,h)$ is a...
supermanifold $(M,Q)$ is constructed and, which does not admit any transitive solvable group of isometries if $p>3$. The twistor bundle $Z \rightarrow M$ and the canonical $\{\text{SO} \}$ principal bundle $S \rightarrow M$ associated to the quaternionic manifold $(M,Q)$ are shown to be homogeneous under the automorphism group of the base. More specifically, the twistor space is a homogeneous complex manifold carrying an invariant holomorphic distribution $\mathcal{D}$ of complex codimension one, which is a complex contact structure if and only if $\Pi$ is nondegenerate. Moreover, an equivariant open holomorphic immersion $Z \rightarrow \bar{Z}$ into a homogeneous complex manifold $\bar{Z}$ of complex algebraic group is constructed. Finally, the construction is shown to have a natural mirror in the category of supermanifolds. In fact, for any $\mathfrak{spin}$-equivariant linear map $\Pi: \vee^2 W \rightarrow V$ a homogeneous quaternionic supermanifold $(M,Q,g)$ if the symmetric vector valued bilinear form $\Pi$ is nondegenerate.

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**Algebraic Groups and Their Generalizations: Quantum and infinite dimensional methods**

William Joseph Haboush - 1994

Proceedings of a research institute held at Pennsylvania State University, July 1991,
on their sixtieth birthdays, held in May of 2005 at methods of algebraic groups. Topics include perverse sheaves, finite Chevalley groups, the general theory of algebraic groups, representations, invariant theory, general

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North Carolina State University. Some of the papers in this volume give inspiring expositions on the development and status of their respective research areas. Others outline and explore the challenges as well as the future directions of research for the twenty-first century. The focus of the papers in this volume is mainly on Lie algebras, quantum groups, vertex operator algebras and their applications to number theory, combinatorics and conformal field theory. This book is useful for graduate students and researchers in mathematics and mathematical physics who want to be introduced to different areas of current research or explore the frontiers of research in the areas mentioned above.

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Moonshine, the Monster, and Related Topics
- Chongying Dong - 1996

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Categories of Operator Modules (Morita Equivalence and Projective Modules) - David P. Blecher - 2000

Abstract. We employ recent advances in the theory of operator spaces, also known as quantized functional analysis, to provide a context in which one can compare categories of modules over operator algebras that are not necessarily self-adjoint. We focus our attention on the category of Hilbert modules over an operator algebra and on the category of operator modules over an operator algebra. The module operations are assumed to be completely bounded - usually, completely contractive. We
develop the notion of a Morita context between two operator algebras $A$ and $B$. This is a system $(A,B,\{\_\_\_A}{X}_B,\{\_\_\_B}{Y}_A,({\cdot}\,\cdot),[[\cdot]\,\cdot])$ consisting of the algebras, two bimodules $\{\_\_\_A}{X}_B$ and $\{\_\_\_B}{Y}_A$ and pairings $(({\cdot}\,\cdot)$ and $[[\cdot]\,\cdot]$ that induce (complete) isomorphisms between the (balanced) Haagerup tensor products, $X \otimes_{hB} Y$ and $Y \otimes_{hA} X$, and the algebras, $A$ and $B$, respectively. Thus, formally, a Morita context is the same as that which appears in pure ring theory. The subtleties of the theory lie in the interplay between the pure algebra and the operator space geometry. Our analysis leads to viable notions of projective operator modules and dual operator modules. We show that two C${}^*$-algebras are Morita equivalent in our sense if and only if they are C$^\ast$-algebraically strong Morita equivalent, and moreover the equivalence bimodules are the same. The distinctive features of the non-self-adjoint theory are illuminated through a number of examples drawn from complex analysis and the theory of incidence algebras over topological partial orders. Finally, an appendix provides links to the literature that developed since this Memoir was accepted for publication.

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**Invariants Under Tori of Rings of Differential Operators and Related Topics** -
Ian Malcolm Musson - 1998
If $G$ is a reductive algebraic group acting
rationally on a smooth affine variety $X$, then it
is generally believed that $D(X)^G$ has
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the authors show that this is indeed the case
when $G$ is a torus and $X = k^r \times (k^*)^s$. They give a precise description of the primitive
ideals in $D(X)^G$ and study in detail the ring
theoretical and homological properties of the
minimal primitive quotients of $D(X)^G$. The
latter are of the form $B^x = D(X)^G/({\mathfrak g}-\chi({\mathfrak g}))$ where ${\mathfrak g} = \text{Lie}(G)$, $\chi \in {\mathfrak g}^*$ and ${\mathfrak g}-\chi({\mathfrak g})$ is the set of all $v-\chi(v)$ with $v \in
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proven that if $G$ is a torus acting rationally on
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$D(X/L!/G)$ is a simple ring.

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**Moonshine - The First Quarter Century and Beyond**
- James Lepowsky - 2010-06-03
In 1979, John Conway and Simon Norton's famous paper, 'Monstrous Moonshine', outlined the remarkable connection between the monster group M and the theory of modular functions. The search for an explanation of this phenomenon involved the development and application of diverse areas of mathematics, including (generalized) Kac-Moody algebras, vertex (operator) algebras, automorphic forms and elliptic cohomology, together with string and conformal field theory from theoretical physics. This volume consists of seventeen papers based on talks presented at a workshop held to mark the anniversary of 'Monstrous Moonshine'. Containing a mixture of expository and current research material, they illustrate its extensive impact and reflect the broad range of research activity that has stemmed from the Moonshine conjectures. Potential directions for future development are also discussed. --Provided by publisher.
in field theory and fractional statistics.
Eduardo Fradkin - 2013-02-28
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This work is motivated by and develops in field theory and fractional statistics.

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**Affine Lie Algebras and Quantum Groups** - Jürgen Fuchs - 1995-03-09
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**High Energy Physics Index** - - 1994

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**Vertex Operator Algebras and the Monster** - Igor Frenkel - 1989-05-01
This work is motivated by and develops connections between several branches of mathematics and physics--the theories of Lie algebras, finite groups and modular functions in mathematics, and string theory in physics. The first part of the book presents a new mathematical theory of vertex operator algebras, the algebraic counterpart of two-dimensional holomorphic conformal quantum field theory. The remaining part constructs the Monster finite simple group as the automorphism group of a very special vertex operator algebra, called the "moonshine module" because of its relevance to "monstrous moonshine."

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**Homogeneous Integral Table Algebras of Degree Three: A Trilogy** - Harvey I. Blau - 2000

This book features homogeneous integral table algebras of degree three with a faithful real element. The algebras of the title are classified to exact isomorphism; that is, the sets of structure constants which arise from the given basis are completely determined. Other results describe all possible extensions (pre-images), with a faithful element which is not necessarily real, of certain simple homogeneous integral table algebras of degree three. On antisymmetric homogeneous integral table algebras of degree three. This paper determines the homogeneous integral basis has a faithful element and has no nontrivial elements that are either real (symmetric) or linear, and where an additional hypothesis is satisfied. It is shown that all such bases must occur as the set of orbit sums in the complex group algebra of a finite abelian group under the action of a fixed-point-free automorphism of order three. Homogeneous integral table algebras of degree three with no nontrivial linear elements. The algebras of the title which also have a faithful element are determined to exact isomorphism. All of the simple homogeneous integral table algebras of degree three are displayed, and the commutative association schemes in which all the nondiagonal relations have valency three and where some relation defines a connected graph on the underlying set are classified up to algebraic isomorphism.

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**Rational Homotopical Models and Uniqueness** - Martin Majewski - 2000

The main goal of this paper is to prove the following conjecture of Baues and Lemaire: the differential graded Lie algebra associated with the Sullivan model of a space is homotopy equivalent to its Quillen model. In addition we show the same for the cellular Lie algebra model which we build from the simplicial analog of the classical Adams-Hilton model. It turns out that this cellular Lie algebra model is one link in a chain of models connecting the models of Quillen and Sullivan. The key result which makes all this possible is Anick's correspondence between
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Hopf Algebras, Polynomial Formal Groups, and Raynaud Orders - Lindsay Childs - 1998
This book gives two new methods for constructing $p$-elementary Hopf algebra orders over the valuation ring $\mathcal{R}$ of a local field $\mathcal{K}$ containing the $p$-adic rational numbers. One method constructs Hopf orders using isogenies of commutative degree 2 polynomial formal groups of dimension $n$, and is built on a systematic study of such formal group laws. The other method uses an exponential generalization of a 1992 construction of Greither. Both
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In this volume, the authors demonstrate under some assumptions on $f^+ , f^-$ that a solution to the classical Monge-Kantorovich problem of optimally rearranging the measure $\mu^+ = f^+ dx$ onto $\mu^- = f^- dy$ can be constructed by studying the $p$-Laplacian equation $- \text{div}(|Du_p|^{p-2}Du_p) = f^+ - f^-$ in the limit as $p \rightarrow \infty$. The idea is to show $u_p \rightarrow u$, where $u$ satisfies $\text{div}(aDu) = f^+ - f^-$ for some density $a \geq 0$, and then to build a flow by solving a nonautonomous ODE involving $a$, $Du$, $f^+$ and $f^-$. 

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and show that level $k$ highest weight solution to the classical Monge-Kantorovich problem of optimally rearranging the measure $\mu^+=f^+dx$ onto $\mu^-=-f^-dy$ can be constructed by studying the $p$-Laplacian equation $-\mathrm{div}(\vert DU_p\vert^{p-2}Du_p)=f^+-f^-$ in the limit as $p\rightarrow\infty$. The idea is to show $u_p\rightarrow u$, where $u$ satisfies $-\mathrm{div}(aDu)=f^+-f^-$ for some density $a\geq 0$, and then to build a flow by solving a nonautonomous ODE involving $a$, $Du$, $f^+$ and $f^-$. 

Annihilating Fields of Standard Modules of $\mathfrak{sl}(2,\mathbb{C})^{\sim}$ and Combinatorial Identities - Arne Meurman - 1999
In this volume, the authors show that a set of local admissible fields generates a vertex algebra. For an affine Lie algebra $\tilde{\mathfrak{g}}$, they construct the corresponding level $k$ vertex operator algebra $\tilde{\mathfrak{g}}$-modules are modules for this vertex operator algebra. They determine the set of annihilating fields of level $k$ standard modules and study the corresponding loop $\tilde{\mathfrak{g}}$-module--the set of relations that defines standard modules. In the case when $\tilde{\mathfrak{g}}$ is of type $A^\{(1)\}_1$, they construct bases of standard modules parameterized by colored partitions, and as a consequence, obtain a series of Rogers-Ramanujan type combinatorial identities. 

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Hugoniot and entropy conditions for Dirac delta waves are clarified with viscous vanishing method. All of the existence, uniqueness and stability for viscous perturbations are proved analytically.

The Riemann Problem for the Transportation Equations in Gas Dynamics - Wancheng Sheng - 1999
In this volume, the one-dimensional and two-dimensional Riemann problems for the transportation equations in gas dynamics are solved constructively. In either the 1-D or 2-D case, there are only two kinds of solutions: one involves Dirac delta waves, and the other involves vacuums, which have been merely discussed so far. The generalized Rankine-Hugoniot and entropy conditions for Dirac delta waves are clarified with viscous vanishing method. All of the existence, uniqueness and stability for viscous perturbations are proved analytically.
First I will introduce a generalization of the notion of (right)-exact functor between abelian categories to the case of non-additive functors. The main result of this section is an extension theorem: any functor defined on a suitable subcategory can be extended uniquely to a right exact functor defined on the whole category.

Next I use those results to define various functors of generalized tensor induction, associated to finite bisets, between categories attached to finite groups. This includes a definition of tensor induction for Mackey functors, for cohomological Mackey functors, for $p$-permutation modules and algebras. This also gives a single formalism of bisets for restriction, inflation, and ordinary tensor induction for modules.

**Basic Concepts of String Theory** - Ralph Blumenhagen - 2012-10-04

The purpose of this book is to thoroughly prepare the reader for research in string theory at an
fashion. Beyond the basics, a number of more advanced topics are introduced, such as conformal field theory, superstrings and string dualities - the text does not cover applications to black hole physics and cosmology, nor strings theory at finite temperatures. End-of-chapter references have been added to guide the reader wishing to pursue further studies or to start research in well-defined topics covered by this book.

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**Squared Hopf Algebras** - Volodymyr V. Lyubashenko - 1999
This book is intended for graduate students and research mathematicians interested in associative rings and algebras.
Let $G$ be a group, $p$ a fixed prime, $I = \{1, \ldots, n\}$ and let $B$ and $P_i, i \in I$ be a collection of finite subgroups of $G$. Then $G$ satisfies $P_n$ (with respect to $p$, $B$ and $P_i, i \in I$) if: (1) $G = \langle P_i \mid i \in I \rangle$, (2) $B$ is the normalizer of a $p$-Sylow-subgroup in $P_i$, (3) No nontrivial normal subgroup of $B$ is normal in $G$, (4) $O^{p'}(P_i/O_p(P_i))$ is a rank 1 Lie-type group in char $p$ (also including solvable cases). If $n = 2$, then the structure of $P_1$, $P_2$ was determined by Delgado and Stellmacher. In this book the authors treat the case $n = 3$. This has applications for locally finite, chamber transitive Tits-geometries and the classification of quasithin groups.

**Rank 3 Amalgams** - Bernd Stellmacher - 1998

Let $G$ be a group, $p$ a fixed prime, $I = \{1, \ldots, n\}$ and let $B$ and $P_i, i \in I$ be a collection of finite subgroups of $G$. Then $G$ satisfies $P_n$ (with respect to $p$, $B$ and $P_i, i \in I$) if: (1) $G = \langle P_i \mid i \in I \rangle$, (2) $B$ is the normalizer of a $p$-Sylow-subgroup in $P_i$, (3) No nontrivial normal subgroup of $B$ is normal in $G$, (4) $O^{p'}(P_i/O_p(P_i))$ is a rank 1 Lie-type group in char $p$ (also including solvable cases). If $n = 2$, then the structure of $P_1$, $P_2$ was determined by Delgado and Stellmacher. In this book the authors treat the case $n = 3$. This has applications for locally finite, chamber transitive Tits-geometries and the classification of quasithin groups.


Since the early 1970s, mathematicians have tried to extend the work of N. Fenichel and of M. Hirsch, C. Pugh and M. Shub to give conditions under which invariant manifolds for semiflows persist under perturbation of the semiflow. This work provides natural conditions and establishes the desired theorem. The technique is geometric...
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Flat Extensions of Positive Moment Matrices: Recursively Generated Relations - Raúl E. Curto - 1998
In this book, the authors develop new computational tests for existence and uniqueness of representing measures $\mu$ in the Truncated Complex Moment Problem: $\gamma_{ij} = \int \bar{z}^i z^j \, d\mu$ $(0 \leq i+j \leq 2n)$. Conditions for the existence of finitely atomic representing measures are expressed in terms of positivity and extension properties of the moment matrix $M(n)(\gamma)$ associated with $\gamma^{(2n)} = \gamma_{00}, \dots, \gamma_{0,2n}, \dots, \gamma_{2n,0}$, $\gamma_{00} > 0$. This study includes new conditions for flat (i.e., rank-preserving) extensions $M(n+1)$ of $M(n) \geq 0$; each such extension corresponds to a distinct rank $M(n)$-atomic representing measure, and each such measure is minimal among...
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Conditions for the existence of finitely atomic representing measures are expressed in terms of positivity and extension properties of the moment matrix \( M(n)(\gamma) \) associated with \( \gamma \equiv \gamma^{(2n)}: \gamma_{00}, \ldots, \gamma_{0,2n}, \ldots, \gamma_{2n,0}, \gamma_{00} > 0 \). This study includes new conditions for flat (i.e., rank-preserving) extensions \( M(n+1) \geq 0 \); each such extension corresponds to a distinct rank \( M(n) \)-atomic representing measure, and each such measure is minimal among representing measures in terms of the cardinality of its support. For a natural class of moment matrices satisfying the tests of recursive generation, recursive consistency, and normal consistency, the existence problem for minimal

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representing measures is reduced to the solubility of small systems of multivariable algebraic equations. In a variety of applications, including cases of the quartic moment problem ($n=2$), the text includes explicit constructions of minimal representing measures via the theory of flat extensions. Additional computational texts are used to prove non-existence of representing measures or the non-existence of minimal representing measures. These tests are used to illustrate, in very concrete terms, new phenomena, associated with higher-dimensional moment problems that do not appear in the classical one-dimensional moment problem.


This volume develops a systematic study of time-dependent control processes. The basic problem of null controllability of linear systems is first considered. Using methods of ergodic theory and topological dynamics, general local null controllability criteria are given. Then the subtle question of global null controllability is studied. Next, the random linear feedback and stabilization problem is posed and solved. Using concepts of exponential dichotomy and rotation number for linear Hamiltonian systems, a solution of the Riccati equation is obtained which has extremely good robustness properties and which also preserves all the smoothness and recurrence properties of the coefficients. Finally, a general version of the local nonlinear feedback stabilization problem is solved.
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Asymptotics for Solutions of Linear Differential Equations Having Turning Points with Applications - Shlomo Strelitz - 1999

Asymptotics are built for the solutions $y_j(x, \lambda), y_j DEGREES{(k)}(0, \lambda)=\delta_{j, n-k}$, $0 \le j, k+1 \le n$ of the equation $L(y)=\lambda p(x)y, \quad x \in [0,1]$, where $L(y)$ is a linear differential operator of whatever order $n \ge 2$ and $p(x)$ is assumed to possess a finite number of turning points. The established asymptotics are

existence of infinite eigenvalue sequences for various multipoint boundary problems posed on $L(y)=\lambda p(x)y, \quad x \in [0,1]$, especially as $n=2$ and $n=3$ (let us be aware that the same method can be successfully applied on many occasions in case $n>3$ too) and 2) asymptotical distribution of the corresponding eigenvalue sequences on the
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**Almost Automorphic and Almost Periodic Dynamics in Skew-Product Semiflows** - Wenxian Shen - 1998

This volume is devoted to the study of almost automorphic dynamics in differential equations. By making use of techniques from abstract topological dynamics, it is shown that almost automorphy, a notion which was introduced by S. Bochner in 1955, is essential and fundamental in the qualitative study of almost periodic differential equations. Fundamental notions from topological dynamics are introduced in the first part of the book. Harmonic properties of almost automorphic functions such as Fourier series and containment result is provided. In the second part, lifting dynamics of $\omega$-limit sets and minimal sets of a skew-product semiflow from an almost periodic minimal base flow are studied. Skew-product semiflows with (strongly) order preserving or monotone natures on fibers are given particular attention. It is proved that a linearly stable minimal set must be almost automorphic and become almost periodic if it is also uniformly stable. Other issues such as flow extensions and the existence of almost periodic global attractors, etc., are also studied. The third part of the book deals with dynamics of almost periodic differential equations. In this part, the general theory developed in the previous two parts is applied to study almost automorphic and almost periodic dynamics which are lifted from certain coefficient structures (e.g., almost automorphic or almost periodic) of differential equations. It is shown that (harmonic or subharmonic) almost automorphic solutions exist.
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**Continuous Tensor Products and Arveson's Spectral $C^*$-Algebras** - Joachim Zacharias - 2000

This book is intended for graduate students and
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**Uniform Rectifiability and Quasiminimizing Sets of Arbitrary Codimension** - Guy David - 2000
Roughly speaking, a $d$-dimensional subset of $\mathbf{R}^n$ is minimizing if arbitrary deformations of it (in a suitable class) cannot decrease its $d$-dimensional volume. For quasiminimizing sets, one allows the mass to decrease, but only in a controlled manner. To make this precise we follow Almgren's notion of 'restricted sets' \cite{2}. Graphs of Lipschitz mappings $f: \mathbf{R}^d \to \mathbf{R}^{n-d}$ are always quasiminimizing,
Roughly speaking, a $d$-dimensional subset of issue is to first replace $K$ by a set which is minimizing for a measurement of volume that imposes a large penalty on points which lie outside of $K$. This leads to a kind of regularization of $K$, in which cusps and very scattered parts of $K$ are removed, but without adding more than a small amount from the complement of $K$. The results for quasiminimizing sets then lead to uniform rectifiability properties of this regularization of $K$. To actually produce minimizers of general functionals it is sometimes convenient to work with (finite) discrete models. A nice feature of uniform rectifiability is that it provides a way to have bounds that cooperate robustly with discrete approximations, and which survive in the limit as the discretization becomes finer and finer.

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A Computation of $\delta^1_5$ - Steve Jackson - 1999
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Morava K-Theories and Localisation - Mark Hovey - 1999
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**Dynamical Zeta Functions, Nielsen Theory and Reidemeister Torsion** - Alexander Fel'shtyn - 2000
In this paper, we study new dynamical zeta functions connected with Nielsen fixed point theory. The study of dynamical zeta functions is part of the theory of dynamical systems, but it is also intimately related to algebraic geometry, number theory, topology and statistical mechanics. The paper consists of four parts. Part I presents a brief account of the Nielsen fixed point theory. Part II deals with dynamical zeta functions connected with Nielsen fixed point theory. Part III is concerned with analog of Dold congruences for the Reidemeister and Nielsen numbers. In Part IV, we explain how dynamical zeta functions give rise to the Reidemeister torsion, a very important topological invariant which has useful applications in knots theory, quantum field theory and dynamical systems.
research mathematicians working in group theory and generalizations

**Limit Theorems for Functionals of Ergodic Markov Chains with General State Space** - Xia Chen - 1999
This book is intended for graduate students and research mathematicians working probability theory and statistics.

**Treelike Structures Arising from Continua and Convergence Groups** - Brian Hayward Bowditch - 1999
This book is intended for graduate students and research mathematicians working in group theory and generalizations

**Algebraic and Strong Splittings of Extensions of Banach Algebras** - William G. Bade - 1999
In this volume, the authors address the following: Let $\mathfrak{A}$ be a Banach algebra, and let $\mathfrak{A}\overset{\pi}{\rightarrow} A\overset{\theta}{\rightarrow} \mathfrak{A}$ be an extension of $\mathfrak{A}$, where $\mathfrak{A}$ is a Banach algebra and $I$ is a closed ideal in $\mathfrak{A}$. The extension splits algebraically (respectively, splits strongly) if there is a homomorphism (respectively, continuous homomorphism) $\theta: A\rightarrow \mathfrak{A}$. The extension splits algebraically (respectively, splits strongly) if there is a homomorphism (respectively, continuous homomorphism) $\theta: A\rightarrow \mathfrak{A}$.
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