Vector-valued Laplace Transforms and Cauchy Problems

This monograph gives a systematic account of the theory of vector-valued Laplace transforms, ranging from representation theory to Tauberian theorems. In parallel, the theory of linear Cauchy problems and semigroups of operators is developed completely in the spirit of Laplace transforms. Existence and uniqueness, regularity, approximation and above all asymptotic behaviour of solutions are studied. Diverse applications to partial differential equations are given. The book contains an introduction to the Bochner integral and several appendices on background material. It is addressed to students and researchers interested in evolution equations, Laplace and Fourier transforms, and functional analysis.

Features
- Standard reference on Laplace transform
- Nontrivial applications of functional analysis
- Accessible and self-contained text

Contents

Fields of interest
Partial Differential Equations

Target groups
Research

Discount group
P
Computational Approach to Riemann Surfaces

This volume offers a well-structured overview of existing computational approaches to Riemann surfaces and those currently in development. The authors of the contributions represent the groups providing publically available numerical codes in this field. Thus this volume illustrates which software tools are available and how they can be used in practice. In addition examples for solutions to partial differential equations and in surface theory are presented.

The intended audience of this book is twofold. It can be used as a textbook for a graduate course in numerics of Riemann surfaces, in which case the standard undergraduate background, i.e., calculus and linear algebra, is required. In particular, no knowledge of the theory of Riemann surfaces is expected; the necessary background in this theory is contained in the Introduction chapter.

Features
- Self-contained introduction to the theory of Riemann surfaces
- Detailed explanation of existing codes with examples
- Visualization of solutions to integrable partial differential equations and surfaces

Contents
Introduction to Compact Riemann Surfaces.
- Computing with plane algebraic curves and Riemann surfaces: the algorithms of the Maple package "algcurves".
- Algebraic curves and Riemann surfaces in Matlab.
- Uniformizing real hyperelliptic M-curves using the Schottky-Klein prime function.
- Period Matrices of Polyhedral Surfaces.
- On the spectral theory of the Laplacian on compact polyhedral surfaces of arbitrary genus.

Fields of interest
Algebraic Geometry; Functions of a Complex Variable; Numerical Analysis

Target groups
Research

Discount group
P

Risk and Meaning
Adversaries in Art, Science and Philosophy

This richly illustrated book is an exploration of how chance and risk, on the one hand, and meaning or significance on the other, compete for the limelight in art, in philosophy, and in science. In modern society, prudence and probability calculation permeate our daily lives. Yet it is clear for all to see that neither cautious bank regulations nor mathematics have prevented economic crises from occurring time and again. Nicolas Bouleau argues that it is the meaning we assign to an event that determines the perceived risk, and that we generally turn a blind eye to this important fact, because the word "meaning" is itself awkward to explain. He tackles this fundamental question through examples taken from cultural fields ranging from painting, architecture, and music, to poetry, biology, and astronomy.

Features
- Book to stimulate the eyes and the intellect
- An original and unusual marriage of Science and Art
- Shows how ideas of chance affect all aspects of our lives and culture
- Reveals how scientific questions and ideas are taken up in creative works

Contents
Entrance: Interpretation and Paradigms.
- I. Cicero and Divination.
- II. Cournot's "Philosophic Probabilities".
- III. Mathematical Probabilities.
- IV. Democracy by Chance.
- V. Gestalt, Structure, Pattern.
- VI. The Third Dimension of Risk.
- VII. "Modern" Architecture.
- VIII. The Ideal City.
- IX. Daring the Abstract in Art.
- X. Saussure or the Dread of Mathematical Probabilities.
- XI. Jacques Monod's Roulette.
- XII. From Fortuitism to Animism.
- XIII. The Slip as Fortuity and Meaning.
- XIV. Guessing Astronomy.
- XV. The Legitimacy of Science and Love.
- Hints and Index.

Fields of interest
Probability Theory and Stochastic Processes; Aesthetics; Arts

Target groups
Popular/general

Discount group
P

Modular Invariant Theory

This book covers the modular invariant theory of finite groups, the case when the characteristic of the field divides the order of the group, a theory that is more complicated than the study of the classical non-modular case. Largely self-contained, the book develops the theory from its origins up to modern results. It explores many examples, illustrating the theory and its contrast with the better understood non-modular setting. It details techniques for the computation of invariants for many modular representations of finite groups, especially the case of the cyclic group of prime order. It includes detailed examples of many topics as well as a quick survey of the elements of algebraic geometry and commutative algebra as they apply to invariant theory. The book is aimed at both graduate students and researchers—an introduction to many important topics in modern algebra within a concrete setting for the former, an exploration of a fascinating subfield of algebraic geometry for the latter.

Features
- Many example
- Illustration of techniques and phenomena
- Can be used as a graduate textbook

Contents
1 First Steps.
- 2 Elements of Algebraic Geometry and Commutative Algebra.
- 3 Applications of Commutative Algebra to Invariant Theory.
- 4 Examples.
- 5 Monomial Orderings and SAGBI Bases.
- 6 Block Bases.
- 7 The Cyclic Group Cp.
- 8 Polynomial Invariant Rings.
- 9 The Transfer.
- 10 Invariant Rings via Localization.
- 11 Rings of Invariants which are Hypersurfaces.
- 12 Separating Invariants.
- 13 Using SAGBI Bases to Compute Rings of Invariants.
- 14 Ladders.
- References.
- Index.

Fields of interest
Commutative Rings and Algebras; Algebra; Algebraic Geometry

Target groups
Research

Discount group
P
Probability and Stochastics

This text is an introduction to the modern theory and applications of probability and stochastics. The style and coverage is geared towards the theory of stochastic processes, but with some attention to the applications. In many instances the gist of the problem is introduced in practical, everyday language and then is made precise in mathematical form. The first four chapters are on probability theory: measure and integration, probability spaces, conditional expectations, and the classical limit theorems. There follows chapters on martingales, Poisson random measures, Levy Processes, Brownian motion, and Markov Processes. Special attention is paid to Poisson random measures and their roles in regulating the excursions of Brownian motion and the jumps of Levy and Markov processes.

Features
► Exercises are plentiful and of high quality
► Explanations and writing are unusually clear
► Author provides a nice balance of theory and applications

Contents

Fields of interest
Probability Theory and Stochastic Processes; Measure and Integration

Target groups
Graduate

Discount group
P

Random Perturbation of PDEs and Fluid Dynamic Models

The book deals with the random perturbation of PDEs which lack well-posedness, mainly because of their non-uniqueness, in some cases because of blow-up. The aim is to show that noise may restore uniqueness or prevent blow-up. This is not a general or easy-to-apply rule, and the theory presented in the book is in fact a series of examples with a few unifying ideas. The role of additive and bilinear multiplicative noise is described and a variety of examples are included, from abstract parabolic evolution equations with non-Lipschitz nonlinearities to particular fluid dynamic models, like the dyadic model, linear transport equations and motion of point vortices.

Features
► Sometimes SPDEs perform better than PDEs: the book aims to understand when and why
► Non traditional research directions in SPDE theory are presented
► The interaction between noise and uniqueness or singularities is investigated
► Stochastic fluid dynamic models are treated by special techniques

Contents

Field of interest
Probability Theory and Stochastic Processes

Target groups
Research

Discount group
P
CGAL Arrangements and Their Applications

A Step-by-Step Guide

Arrangements of curves constitute fundamental structures that have been intensively studied in computational geometry. Arrangements have numerous applications in a wide range of areas—examples include geographic information systems, robot motion planning, statistics, computer-assisted surgery and molecular biology. Implementing robust algorithms for arrangements is a notoriously difficult task, and the CGAL arrangements package is the first robust, comprehensive, generic and efficient implementation of arrangements of curves. This book is about how to use the CGAL two-dimensional arrangement package to solve problems.

Features
► A practical guide to an important area of computational geometry ► Contains numerous worked examples and program descriptions ► Supported by a dedicated website

Fields of interest
Geometry; Computer Imaging, Vision, Pattern Recognition and Graphics; Applied Mathematics/Computational Methods of Engineering

Target groups
Graduate

Discount group
P

Discount group

Discrete Mathematics

This book gives an introduction to discrete mathematics for beginning undergraduates. One of original features of this book is that it begins with a presentation of the rules of logic as used in mathematics. Many examples of formal and informal proofs are given. With this logical framework firmly in place, the book describes the major axioms of set theory and introduces the natural numbers. The rest of the book is more standard. It deals with functions and relations, directed and undirected graphs, and an introduction to combinatorics. There is a section on public key cryptography and RSA, with complete proofs of Fermat’s little theorem and the correctness of the RSA scheme, as well as explicit algorithms to perform modular arithmetic. The last chapter provides more graph theory. Eulerian and Hamiltonian cycles are discussed. Then, we study flows and tensions and state and prove the max flow min-cut theorem. We also discuss matchings, covering, bipartite graphs.

Features
► Summarizing the rules of mathematical reasoning and how to construct proofs ► Presents examples of formal and informal proofs ► Includes examples of proofs by induction ► Discusses public key cryptography, with a complete proof of the correctness of RSA Explicit, detailed algorithms for modular arithmetic ► Explores graph flows and the max-flow min-cut theorem ► Covers planar graphs

Contents

Fields of interest
Number Theory; Computer Imaging, Vision, Pattern Recognition and Graphics; Engineering Design

Target groups
Lower undergraduate

Discount group
P

Integral Geometry and Radon Transforms

In this text, integral geometry deals with Radon’s problem of representing a function on a manifold in terms of its integrals over certain submanifolds—hence the term the Radon transform. Examples and far-reaching generalizations lead to fundamental problems such as: (i) injectivity, (ii) inversion formulas, (iii) support questions, (iv) applications (e.g., to tomography, partial differential equations and group representations). For the case of the plane, the inversion theorem and the support theorem have had major applications in medicine through tomography and CAT scanning. While containing some recent research, the book is aimed at beginning graduate students for classroom use or self-study. A number of exercises point to further results with documentation.

Features
► Accessible to advanced undergraduates ► New content on lie group theory accessible to anyone familiar with manifolds ► Self-contained chapters each with bibliographical notes and practice exercises

Contents

Fields of interest
Differential Geometry; Integral Transforms, Operational Calculus; Global Analysis and Analysis on Manifolds

Target groups
Graduate

Discount group
P
A. S. Holevo, Steklov Mathematical Institute, Moscow, Russia

**Probabilistic and Statistical Aspects of Quantum Theory**

This book is devoted to aspects of the foundations of quantum mechanics in which probabilistic and statistical concepts play an essential role. The main part of the book concerns the quantitative statistical theory of quantum measurement, based on the notion of positive operator-valued measures. During the past years there has been substantial progress in this direction, stimulated to a great extent by new applications such as Quantum Optics, Quantum Communication and high-precision experiments. The questions of statistical interpretation, quantum symmetries, theory of canonical commutation relations and Gaussian states, uncertainty relations as well as new fundamental bounds concerning the accuracy of quantum measurements, are discussed in this book in an accessible yet rigorous way. Compared to the first edition, there is a new Supplement devoted to the hidden variable issue. Comments and the bibliography have also been extended and updated.

**Features**
- Original approach to foundations of quantum mechanics via mathematical statistics leading to substantial generalization of standard notion of quantum observable
- Introduction to the “noncommutative” mathematical statistics providing a methodological basis for quantitative study of quantum measurements
- Systematic study of correspondence between classical and quantum observables based on the concepts of covariance and optimality

**From the contents**

**Field of interest**
Probability Theory and Stochastic Processes

**Target groups**
Research

**Discount group**
P

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M. Kauers, P. Paule, Linz, Austria

**The Concrete Tetrahedron**
Symbolic Sums, Recurrence Equations, Generating Functions, Asymptotic Estimates

The book treats four mathematical concepts which play a fundamental role in many different areas of mathematics: symbolic sums, recurrence (difference) equations, generating functions, and asymptotic estimates. Their key features, in isolation or in combination, their mastery by paper and pencil or by computer programs, and their applications to problems in pure mathematics or to “real world problems” (e.g., the analysis of algorithms) are studied. The book is intended as an algorithmic supplement to the bestselling “Concrete Mathematics” by Graham, Knuth and Patashnik.

**Features**
- Concrete mathematics from a computer algebra perspective
- Informal style: as simple as possible, as complicated as necessary
- Includes motivating applications from combinatorics, computer science, number theory, special functions

**Contents**

**Fields of interest**
Sequences, Series, Summability; Special Functions; Algorithms

**Target groups**
Upper undergraduate

**Discount group**
P

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A. Kirsch, Universität (TH) Karlsruhe, Germany

**An Introduction to the Mathematical Theory of Inverse Problems**

This book introduces the reader to the area of inverse problems. The study of inverse problems is of vital interest to many areas of science and technology such as geophysical exploration, system identification, nondestructive testing and ultrasonic tomography. The aim of this book is twofold: in the first part, the reader is exposed to the basic notions and difficulties encountered with ill-posed problems. Basic properties of regularization methods for linear ill-posed problems are studied by means of several simple analytical and numerical examples. The second part of the book presents two special nonlinear inverse problems in detail - the inverse spectral problem and the inverse scattering problem. The corresponding direct problems are studied with respect to existence, uniqueness and continuous dependence on parameters.

**Features**
- Good mixture of general results and particular cases
- First monograph on inverse problems which contains electrical impedance tomography and the Factorization Method
- New chapters added

**Contents**
Introduction and Basic Concepts.- Regularization Theory for Equations of the First Kind.- Regularization by Discretization.- Inverse Eigenvalue Problems.- An Inverse Problem in Electrical Impedance Tomography.- An Inverse Scattering Problem.- References.- Index

**Fields of interest**
Partial Differential Equations; Ordinary Differential Equations; Appl.Mathematics/Computational Methods of Engineering

**Target groups**
Research

**Discount group**
P

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Due January 2011

2011. 334 p. (Publications of the Scuola Normale Superiore / Monographs (Scuola Normale Superiore), Volume 1) Softcover

$39.95

Due December 2010


$56.95
ISBN 978-3-7091-0444-6

Due January 2011


$approx. 79.95
Eigenvalues, Embeddings and Generalised Trigonometric Functions

The main theme of the book is the study, from the standpoint of s-numbers, of integral operators of Hardy type and related Sobolev embeddings. In the theory of s-numbers the idea is to attach to every bounded linear map between Banach spaces a monotone decreasing sequence of non-negative numbers with a view to the classification of operators according to the way in which these numbers approach a limit: approximation numbers provide an especially important example of such numbers. The asymptotic behavior of the s-numbers of Hardy operators acting between Lebesgue spaces is determined here in a wide variety of cases. The proof methods involve the geometry of Banach spaces and generalized trigonometric functions; there are connections with the theory of the p-Laplacian.

Features
► Review of recent developments in approximation theory for Hardy-type operators and Sobolev embeddings (description of the exact values of s-numbers and widths)
► A special chapter devoted to the theory of generalized trigonometric functions (presented for the first time in a book)
► Description of connections between optimal approximations, eigenvalues for the p-Laplacian and generalized trigonometric functions

Contents
1 Basic material
2 Trigonometric generalisations
3 The Laplacian and some natural variants
4 Hardy operators
5 s-Numbers and generalised trigonometric functions
6 Estimates of s-numbers of weighted Hardy operators
7 More refined estimates
8 A non-linear integral system
9 Hardy operators on variable exponent spaces
10 The Seifert-Van Kampen Theorem
11 Covering Maps
12 Group Actions and Covering Maps
13 Homology
Appendix A: Review of Set Theory
Appendix B: Review of Metric Spaces
Appendix C: Review of Group Theory
References
Notation Index
Subject Index

Fields of interest
Analysis; Approximations and Expansions; Functional Analysis

Target groups
Graduate

Discount group
P

Introduction to Topological Manifolds

This book is an introduction to manifolds at the beginning graduate level. It contains the essential topological ideas that are needed for the further study of manifolds, particularly in the context of differential geometry, algebraic topology, and related fields. Its guiding philosophy is to develop these ideas rigorously but economically, with minimal prerequisites and plenty of geometric intuition. Although this second edition has the same basic structure as the first edition, it has been extensively revised and clarified; not a single page has been left untouched.

Features
► New edition extensively revised and updated
► New introduction to CW complexes (along with a brief and streamlined introduction to simplicial complexes)
► Expanded treatments of manifolds with boundary, local compactness, group actions, proper maps, and a new section on paracompactness

Contents
Preface
1 Introduction
2 Topological Spaces
3 New Spaces from Old
4 Connectedness and Paracompactness
5 Cell Complexes
6 Compact Surfaces
7 Homotopy and the Fundamental Group
8 The Circle
9 Some Group Theory
10 The Seifert-Van Kampen Theorem
11 Covering Maps
12 Group Actions and Covering Maps
13 Homology
Appendix A: Review of Set Theory
Appendix B: Review of Metric Spaces
Appendix C: Review of Group Theory
References
Notation Index
Subject Index

Fields of interest
Manifolds and Cell Complexes (incl. Diff. Topology); Algebraic Topology

Target groups
Graduate

Discount group
P

Advanced Methods of Solid Oxide Fuel Cell Modeling

Fuel cells are widely regarded as the future of the power and transportation industries. Intensive research in this area now requires new methods of fuel cell operation modeling and cell design. Typical mathematical models are based on the physical process description of fuel cells and require a detailed knowledge of the microscopic properties that govern both chemical and electrochemical reactions. Advanced Methods of Solid Oxide Fuel Cell Modeling proposes the alternative methodology of generalized artificial neural networks (ANN) solid oxide fuel cell (SOFC) modeling. Advanced Methods of Solid Oxide Fuel Cell Modeling provides a comprehensive description of modern fuel cell theory and a guide to the mathematical modeling of SOFCs, with particular emphasis on the use of ANNs. Up to now, most of the equations involved in SOFC models have required the addition of numerous factors that are difficult to determine.

Features
► Describes a method of solid oxide fuel cell (SOFC) modeling that can be implemented easily using currently available software
► Offers readers the chance to optimize SOFC design
► Provides a comprehensive description of modern fuel cell theory

Contents
1. Introduction
2. Theory
3. Advanced Methods in Mathematical Modeling
4. Experimental Investigation
5. SOFC Modeling

Fields of interest
Mathematical Modeling and Mathematics in Industry; Industrial Chemistry/Chemical Engineering; Power Electronics, Electrical Machines and Networks

Target groups
Professional/practitioner

Discount group
P
Dynamics, Games and Science I
DYNA 2008, in Honor of Mauricio Peixoto and David Rand, University of Minho, Braga, Portugal, September 8–12, 2008

Dynamics, Games and Science I and II are a selection of surveys and research articles written by leading researchers in mathematics. The majority of the contributions are on dynamical systems and game theory, focusing either on fundamental and theoretical developments or on applications to modeling in biology, econometrics, engineering, finance and psychology. The papers are based on talks given at the International Conference DYNA 2008, held in honor of Mauricio Peixoto and David Rand at the University of Braga, Portugal, on September 8–12, 2008. The aim of these volumes is to present cutting-edge research in these areas to encourage graduate students and researchers in mathematics and other fields to develop them further.

Features
▶ Top-quality contributed volume in two parts, available separately
▶ Research and survey articles helping your way through dynamics and games, mathematical modeling in biology, econometrics, engineering, finance, and psychology
▶ An inspiration for graduate students and researchers in mathematics to develop further research in these topics

Fields of interest
Dynamical Systems and Ergodic Theory; Game Theory, Economics, Social and Behavioral Sciences; Theoretical, Mathematical and Computational Physics

Target groups
Research

Discount group
P

Extensions of Moser–Bangert Theory
Locally Minimal Solutions

With the goal of establishing a version for partial differential equations (PDEs) of the Aubry–Mather theory of monotone twist maps, Moser and then Bangert studied solutions of their model equations that possessed certain minimality and monotonicity properties. This monograph presents extensions of the Moser–Bangert approach that include solutions of a family of nonlinear elliptic PDEs on \( \mathbb{R}^n \) and an Allen–Cahn PDE model of phase transitions. After recalling the relevant Moser–Bangert results, Extensions of Moser–Bangert Theory pursues the rich structure of the set of solutions of a simpler model case, expanding upon the studies of Moser and Bangert to include solutions that merely have local minimality properties.

Features
▶ Outgrowth of Moser–Bangert’s work on solutions of a family of nonlinear elliptic partial differential equations
▶ Develops and examines the rich structure of the set of solutions of the simpler model case (PDE)
▶ Minimization arguments are an important tool in the investigation
▶ Unique book in the literature

Fields of interest
Partial Differential Equations; Calculus of Variations and Optimal Control; Optimization; Dynamical Systems and Ergodic Theory

Target groups
Research

Discount group
P

Perspectives on Projective Geometry
A Guided Tour Through Real and Complex Geometry

Projective geometry is one of the most fundamental and at the same time most beautiful branches of geometry. It can be considered the common foundation of many other geometric disciplines like Euclidean geometry, hyperbolic and elliptic geometry or even relativistic space-time geometry. This book offers a comprehensive introduction to this fascinating field and its applications. In particular, it explains how metric concepts may be best understood in projective terms. One of the major themes that appears throughout this book is the beauty of the interplay between geometry, algebra and combinatorics. This book can especially be used as a guide that explains how geometric objects and operations may be most elegantly expressed in algebraic terms, making it a valuable resource for mathematicians, as well as for computer scientists and physicists. The book is based on the author’s experience in implementing geometric software and includes hundreds of high-quality illustrations.

Features
▶ A comprehensive modern language introduction into the classical topic of projective geometry
▶ Very accessible writing and numerous high quality illustrations
▶ Includes many concrete recipes for implementation of geometric operations

Fields of interest
Geometry; Algebra; Algorithms

Target groups
Graduate

Discount group
P

Due March 2011

Due April 2011

Due March 2011
2011. 573 p. 380 Illus., 250 in color. Hardcover

P. H. Rabinowitz, University of Wisconsin—Madison, Madison, WI, USA; E. W. Stredulinsky, University of Wisconsin—Richland, Richland Center, WI, USA

J. Richter-Gebert, TU München, Germany
Modern Aspects of the Theory of Partial Differential Equations

The book provides a quick overview of a wide range of active research areas in partial differential equations. The book can serve as a useful source of information to mathematicians, scientists and engineers. The volume contains contributions from authors from a large variety of countries on different aspects of partial differential equations, such as evolution equations and estimates for their solutions, control theory, inverse problems, nonlinear equations, elliptic theory on singular domains, numerical approaches.

Features
► Covers a wide range of active research areas in PDE
► Useful source of information for mathematicians, scientists, engineers
► Includes contributions from authors from many different countries

Fields of interest
Analysis; Partial Differential Equations

Target groups
Research

Discount group
P

The Colorado Mathematical Olympiad and Further Explorations

From the Mountains of Colorado to the Peaks of Mathematics

Over the past two decades, the once small local Colorado Springs Mathematical Olympiad, founded by the author himself, has now become an annual state-wide competition, hosting over one-thousand high school contenders each year. This updated printing of the first edition of Colorado Mathematical Olympiad: the First Twenty Years and Further Explorations offers an interesting history of the competition as well as an outline of all the problems and solutions that have been a part of the contest over the years.

Features
► Builds bridges between Olympiads and “real” mathematics by showing how a solved Olympiad problem gives birth to deeper problems and leads to the forefront of mathematical research
► Appeals to both serious and recreational mathematicians on all levels of expertise
► Pairs excellent mathematical content with artful exposition

From the contents
Preface • Olympiad History: What it is and How it Started • Three Celebrated Ideas • Year 1 • Year 2 • Year 3 • Year 4 • Year 5 • Year 6 • Year 7 • Year 8 • Year 9 • Year 10 • Further Explorations • Rooks in Space • Chromatic Number of the Plane • Polygons in a Colored Circle, Polyhedra in a colored Sphere • How Does one Cut a Triangle • Points in Convex Figures • Triangles in a Colored Plane • Rectangles in a Colored Plane • Colored Polygons • Infinite–Finite • Schur’s Theorem • Bibliography • Year 11 • Year 12 • Year 13 • Year 14 • Year 15 • Year 16 • Year 17 • Year 18 • Year 19 • Year 20 • Further Explorations • Chromatic Number of a Grid • Stone Age Entertainment • The Erdös Problem • Squares in a Square • Washington Recangles • Olde Victorian Map Colouring.

Fields of interest
Algebra; Mathematical Logic and Foundations; Geometry

Target groups
Lower undergraduate

Discount group
P

Convex Integration Theory

Solutions to the h-principle in geometry and topology

This book provides a comprehensive study of convex integration theory in immersion-theoretic topology. Convex integration theory, developed originally by M. Gromov, provides general topological methods for solving the h-principle for a wide variety of problems in differential geometry and topology, with applications also to PDE theory and to optimal control theory. Though topological in nature, the theory is based on a precise analytical approximation result for higher order derivatives of functions, proved by M. Gromov. This book is the first to present an exacting record and exposition of all of the basic concepts and technical results of convex integration theory in higher order jet spaces, including the theory of iterated convex hull extensions and the theory of relative h-principles. A second feature of the book is its detailed presentation of applications of the general theory to topics in symplectic topology, divergence free vector fields on 3-manifolds, isometric immersions, totally real embeddings, underdetermined non-linear systems of PDEs, the relaxation theorem in optimal control theory, as well as applications to the traditional immersion-theoretical topics such as immersions, submersions, k-mersions and free maps.

Features
► Comprehensive and systematic monograph on convex integration theory
► Indispensable to all interested in differential topology, symplectic topology and optimal control theory
► Addresses as well as researchers

Field of interest
Mathematics, general

Target groups
Research

Discount group
P

Available

ISBN 978-0-387-75471-1 (£59.95)
ISBN 978-3-0348-0059-4 (approx. $149.00)

M. Ruzhansky, Imperial College London, UK; J. Wirth, University of Stuttgart, Germany (Eds.)

A. Soifer, University of Colorado, Colorado Springs, CO, USA

D. Spring, Glendon College, Toronto, Ontario, Canada
Multicriteria Analysis
Applications to Water and Environment Management

Multicriteria optimization is embedded into decision science. In this book both discrete and continuous models are considered. In addition to classical methods some new concepts and algorithms are discussed including social choice and conflict resolution. Fuzzy sets and stochastic methodology deal with problems under uncertainty. Case studies on different issues of water resources management illustrate the construction of models and solution procedures.

Features
- Comprehensive summary of classical and new methodology
- Detailed case studies in water resources management
- Uncertainty is treated by both fuzzy and stochastic methods
- Social choice and conflict resolution are also discussed

From the contents
1 Introduction to Multi Criteria Decision Analysis
1.1 Decision Analysis 1.2 The Components of MCDA Problems 1.3 Classification of MCDA Problems 1.3.1 Discrete case 1.3.2 Continuous case
2 The Hierarchy of the Criteria 2.1 Introduction 2.2 Criteria 2.2.1 Social criteria 2.2.2 Economic criteria 2.2.3 Environmental criteria
2.3 Constructing the Hierarchy of the Criteria 2.3.1 Value management 2.3.2 Case study 3 Solution of Discrete MCDA Problems 3.1 Introduction 3.2 Dominance Method 3.3 Sequential Optimization (SO) 3.4 The $\epsilon$-Constraint Method ($\epsilon$CM) 3.5 Simple Additive Weighting (SAW) 3.6 Distance Based Methods (DBM) 3.7 The Analytic Hierarchy Process (AHP) 3.8 Other Methods 3.9 Case Studies 3.9.1 Inter-basin water transfer 3.9.2 Urban water management 3.10 Discussions 4 Solution of Continuous MCDA Problems 4.1 Introduction 4.2 Dominance Method 4.3 Sequential Optimization

Fields of interest
Operations Research, Management Science; Civil Engineering; Computer Applications

Target groups
Graduate

Discount group
P

Due March 2011

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