Optimization In Elliptic Problems With Applications To Mechanics Of Deformable Bodies And Fluid Mechanics Operator Theory Advances And Applications

Nonlinear Optimization and Related TopicsOptimization of Elliptic SystemsMultiscale Optimization Methods and ApplicationsMathematical ReviewsVariational Methods in Shape Optimization ProblemsOptimization in Solving Elliptic ProblemsFast Solution of Discretized Optimization ProblemsSystem Modelling and OptimizationOptimization, Simulation, and ControlMathematical Problems in Shape Optimization and Shape Memory MaterialsConvex Optimization in Normed SpacesNumerical Methods for Differential Equations, Optimization, and Technological ProblemsTrends in PDE Constrained OptimizationSystem Modeling and OptimizationRecent Advances in OptimizationCombinatorial Optimization and ApplicationsRobust Optimization-Directed DesignOptimal Shape Design for Elliptic SystemsTopological Derivatives in Shape OptimizationOptimizationOptimization of Elliptic SystemsAdvances in Applied Mathematics and Global OptimizationThe Finite Element Method for Elliptic ProblemsSIAM Journal on Control and OptimizationAnalele ştiinţifice ale Universităţii "Al. I. Cuza" din IaşiShape Optimization And Optimal DesignComputational Optimization of Systems Governed by Partial Differential EquationsDiscretization-Optimization Methods for Nonlinear Elliptic Optimal Control Problems with State ConstraintsApproximation and Optimization of Discrete and Differential InclusionsNumerical Analysis and OptimizationOptimization in Elliptic Problems with Applications to Mechanics of Deformable Bodies and Fluid MechanicsConstrained Optimization and Optimal Control for Partial Differential EquationsOptimizationStudia Universitatis Babeş-BolyaiSemismooth Newton Methods for Variational Inequalities and Constrained Optimization Problems in Function SpacesLarge-Scale PDE-Constrained OptimizationElliptic Problems in Nonsmooth DomainsOptimization in Elliptic Problems with Applications to Mechanics of Deformable Bodies and Fluid MechanicsOptimization with PDE ConstraintsFrontiers in PDE-Constrained Optimization

Nonlinear Optimization and Related Topics

This unique book presents a profound mathematical analysis of general optimization problems for elliptic systems, which are then applied to a great number of optimization problems in mechanics and technology. Accessible and self-contained, it is suitable as a textbook for graduate courses on optimization of elliptic systems.

Optimization of Elliptic Systems

Optimal design, optimal control, and parameter estimation of systems governed by partial differential equations (PDEs) give rise to a class of problems known as PDE-constrained optimization. The size and complexity of the discretized PDEs often pose significant challenges for contemporary optimization methods. With the

maturing of technology for PDE simulation, interest has now increased in PDE-based optimization. The chapters in this volume collectively assess the state of the art in PDE-constrained optimization, identify challenges to optimization presented by modern highly parallel PDE simulation codes, and discuss promising algorithmic and software approaches for addressing them. These contributions represent current research of two strong scientific computing communities, in optimization and PDE simulation. This volume merges perspectives in these two different areas and identifies interesting open questions for further research.

Multiscale Optimization Methods and Applications

This unique book presents a profound mathematical analysis of general optimization problems for elliptic systems, which are then applied to a great number of optimization problems in mechanics and technology. Accessible and self-contained, it is suitable as a textbook for graduate courses on optimization of elliptic systems.

Mathematical Reviews

Offers proceedings of the 5th International Conference on Combinatorial Optimization and Applications. This title features papers that cover a range of topics in combinatorial optimization and applications focussing on experimental and applied research of general algorithmic interest and research motivated by real-world problems.

Variational Methods in Shape Optimization Problems

Solving optimization problems subject to constraints given in terms of partial d- ferential equations (PDEs) with additional constraints on the controls and/or states is one of the most challenging problems in the context of industrial, medical and economical applications, where the transition from model-based numerical si- lations to model-based design and optimal control is crucial. For the treatment of such optimization problems the interaction of optimization techniques and num- ical simulation plays a central role. After proper discretization, the number of op- 3 10 timization variables varies between 10 and 10 . It is only very recently that the enormous advances in computing power have made it possible to attack problems of this size. However, in order to accomplish this task it is crucial to utilize and f- ther explore the speci?c mathematical structure of optimization problems with PDE constraints, and to develop new mathematical approaches concerning mathematical analysis, structure exploiting algorithms, and discretization, with a special focus on prototype applications. The present book provides a modern introduction to the rapidly developing ma- ematical ?eld of optimization with PDE constraints. The ?rst chapter introduces to the analytical background and optimality theory for optimization problems with PDEs. Optimization problems with PDE-constraints are posed in in?nite dim- sional spaces. Therefore, functional analytic techniques, function space theory, as well as existence- and uniqueness results for the underlying PDE are essential to study the existence of optimal solutions and to derive optimality conditions.

Optimization in Solving Elliptic Problems

Fast Solution of Discretized Optimization Problems

Originally published: Boston: Pitman Advanced Pub. Program, 1985.

System Modelling and Optimization

This volume provides a broad and uniform introduction of PDE-constrained optimization as well as to document a number of interesting and challenging applications. Many science and engineering applications necessitate the solution of optimization problems constrained by physical laws that are described by systems of partial differential equations (PDEs). As a result, PDE-constrained optimization problems arise in a variety of disciplines including geophysics, earth and climate science, material science, chemical and mechanical engineering, medical imaging and physics. This volume is divided into two parts. The first part provides a comprehensive treatment of PDE-constrained optimization including discussions of problems constrained by PDEs with uncertain inputs and problems constrained by variational inequalities. Special emphasis is placed on algorithm development and numerical computation. In addition, a comprehensive treatment of inverse problems arising in the oil and gas industry is provided. The second part of this volume focuses on the application of PDE-constrained optimization, including problems in optimal control, optimal design, and inverse problems, among other topics.

Optimization, Simulation, and Control

The objective of this book is to analyze within reasonable limits (it is not a treatise) the basic mathematical aspects of the finite element method. The book should also serve as an introduction to current research on this subject. On the one hand, it is also intended to be a working textbook for advanced courses in Numerical Analysis, as typically taught in graduate courses in American and French universities. For example, it is the author’s experience that a one-semester course (on a three-hour per week basis) can be taught from Chapters 1, 2 and 3 (with the exception of Section 3.3), while another one-semester course can be taught from Chapters 4 and 6. On the other hand, it is hoped that this book will prove to be useful for researchers interested in advanced aspects of the numerical analysis of the finite element method. In this respect, Section 3.3, Chapters 5, 7 and 8, and the sections on “Additional Bibliography and Comments should provide many suggestions for conducting seminars.

Mathematical Problems in Shape Optimization and Shape Memory Materials

The articles that comprise this distinguished annual volume for the Advances in Mechanics and Mathematics series have been written in honor of Gilbert Strang, a world renowned mathematician and exceptional person. Written by leading experts in complementarity, duality, global optimization, and quantum computations, this

collection reveals the beauty of these mathematical disciplines and investigates recent developments in global optimization, nonconvex and nonsmooth analysis, nonlinear programming, theoretical and engineering mechanics, large scale computation, quantum algorithms and computation, and information theory.

Convex Optimization in Normed Spaces

This work familiarises students with mathematical models (PDEs) and methods of numerical solution and optimisation. Including numerous exercises and examples, this is an ideal text for advanced students in Applied Mathematics, Engineering, Physical Science and Computer Science.

Numerical Methods for Differential Equations, Optimization, and Technological Problems

The study of optimal shape design can be arrived at by asking the following question: "What is the best shape for a physical system?" This book is an applications-oriented study of such physical systems; in particular, those which can be described by an elliptic partial differential equation and where the shape is found by the minimum of a single criterion function. There are many problems of this type in high-technology industries. In fact, most numerical simulations of physical systems are solved not to gain better understanding of the phenomena but to obtain better control and design. Problems of this type are described in Chapter 2. Traditionally, optimal shape design has been treated as a branch of the calculus of variations and more specifically of optimal control. This subject interfaces with no less than four fields: optimization, optimal control, partial differential equations (PDEs), and their numerical solutions-this is the most difficult aspect of the subject. Each of these fields is reviewed briefly: PDEs (Chapter 1), optimization (Chapter 4), optimal control (Chapter 5), and numerical methods (Chapters 1 and 4).

Trends in PDE Constrained Optimization

This volume contains the edited texts of the lectures presented at the Workshop on Nonlinear Optimization held in Erice, Sicily, at the "G. Stampacchia" School of Mathematics of the "E. Majorana" Centre for Scientific Culture, June 23 -July 2, 1998. In the tradition of these meetings, the main purpose was to review and discuss recent advances and promising research trends concerning theory, algorithms and innovative applications in the field of Nonlinear Optimization, and of related topics such as Convex Optimization, Nonsmooth Optimization, Variational Inequalities and Complementarity Problems. The meeting was attended by 83 people from 21 countries. Besides the lectures, several formal and informal discussions took place. The result was a wide and deep knowledge of the present research tendencies in the field. We wish to express our appreciation for the active contribution of all the par ticipants in the meeting. Our gratitude is due to the Ettore Majorana Centre in Erice, which offered its facilities and rewarding environment: its staff was certainly instrumental for the success of the meeting. Our gratitude is also due to Francisco Facchinei and Massimo Roma for the effort and time devoted as members of the Organising Committee. We are indebted to

the Italian National Research Council, and in particular to the Group on Functional Analysis and its Applications and to the Committees on Engineering Sciences and on Information Sciences and Technolo gies for their financial support. Finally, we address our thanks to Kluwer Academic Publishers for having offered to publish this volume.

System Modeling and Optimization

As optimization researchers tackle larger and larger problems, scale interactions play an increasingly important role. One general strategy for dealing with a large or difficult problem is to partition it into smaller ones, which are hopefully much easier to solve, and then work backwards towards the solution of original problem, using a solution from a previous level as a starting guess at the next level. This volume contains 22 chapters highlighting some recent research. The topics of the chapters selected for this volume are focused on the development of new solution methodologies, including general multilevel solution techniques, for tackling difficult, large-scale optimization problems that arise in science and industry. Applications presented in the book include but are not limited to the circuit placement problem in VLSI design, a wireless sensor location problem, optimal dosages in the treatment of cancer by radiation therapy, and facility location.

Recent Advances in Optimization

Combinatorial Optimization and Applications

Shape optimization problems are treated from the classical and modern perspectives Targets a broad audience of graduate students in pure and applied mathematics, as well as engineers requiring a solid mathematical basis for the solution of practical problems Requires only a standard knowledge in the calculus of variations, differential equations, and functional analysis Driven by several good examples and illustrations Poses some open questions.

Robust Optimization-Directed Design

Optimal Shape Design for Elliptic Systems

A comprehensive treatment of semismooth Newton methods in function spaces: from their foundations to recent progress in the field. This book is appropriate for researchers and practitioners in PDE-constrained optimization, nonlinear optimization and numerical analysis, as well as engineers interested in the current theory and methods for solving variational inequalities.

Topological Derivatives in Shape Optimization

Optimization problems subject to constraints governed by partial differential equations (PDEs) are among the most challenging problems in the context of industrial, economical and medical applications. Almost the entire range of

problems in this field of research was studied and further explored as part of the Deutsche Forschungsgemeinschaft (DFG) priority program 1253 on “Optimization with Partial Differential Equations” from 2006 to 2013. The investigations were motivated by the fascinating potential applications and challenging mathematical problems that arise in the field of PDE constrained optimization. New analytic and algorithmic paradigms have been developed, implemented and validated in the context of real-world applications. In this special volume, contributions from more than fifteen German universities combine the results of this interdisciplinary program with a focus on applied mathematics. The book is divided into five sections on “Constrained Optimization, Identification and Control”, “Shape and Topology Optimization”, “Adaptivity and Model Reduction”, “Discretization: Concepts and Analysis” and “Applications”. Peer-reviewed research articles present the most recent results in the field of PDE constrained optimization and control problems. Informative survey articles give an overview of topics that set sustainable trends for future research. This makes this special volume interesting not only for mathematicians, but also for engineers and for natural and medical scientists working on processes that can be modeled by PDEs.

Optimization

This book provides a bridge between continuous optimization and PDE modelling and focuses on the numerical solution of the corresponding problems. Intended for graduate students in PDE-constrained optimization, it is also suitable as an introduction for researchers in scientific computing or optimization.

Optimization of Elliptic Systems

This special volume focuses on optimization and control of processes governed by partial differential equations. The contributors are mostly participants of the DFG-priority program 1253: Optimization with PDE-constraints which is active since 2006. The book is organized in sections which cover almost the entire spectrum of modern research in this emerging field. Indeed, even though the field of optimal control and optimization for PDE-constrained problems has undergone a dramatic increase of interest during the last four decades, a full theory for nonlinear problems is still lacking. The contributions of this volume, some of which have the character of survey articles, therefore, aim at creating and developing further new ideas for optimization, control and corresponding numerical simulations of systems of possibly coupled nonlinear partial differential equations. The research conducted within this unique network of groups in more than fifteen German universities focuses on novel methods of optimization, control and identification for problems in infinite-dimensional spaces, shape and topology problems, model reduction and adaptivity, discretization concepts and important applications. Besides the theoretical interest, the most prominent question is about the effectiveness of model-based numerical optimization methods for PDEs versus a black-box approach that uses existing codes, often heuristic-based, for optimization.

Advances in Applied Mathematics and Global Optimization

This work is intended to serve as a guide for graduate students and researchers

who wish to get acquainted with the main theoretical and practical tools for the numerical minimization of convex functions on Hilbert spaces. Therefore, it contains the main tools that are necessary to conduct independent research on the topic. It is also a concise, easy-to-follow and self-contained textbook, which may be useful for any researcher working on related fields, as well as teachers giving graduate-level courses on the topic. It will contain a thorough revision of the extant literature including both classical and state-of-the-art references.

The Finite Element Method for Elliptic Problems

This volume presents developments and advances in modelling passive and active control systems governed by partial differential equations. It emphasizes shape analysis, optimal shape design, controllability, nonlinear boundary control, and stabilization. The authors include essential data on exact boundary controllability of thermoelastic plates wi

SIAM Journal on Control and Optimization

Optimal control theory has numerous applications in both science and engineering. This book presents basic concepts and principles of mathematical programming in terms of set-valued analysis and develops a comprehensive optimality theory of problems described by ordinary and partial differential inclusions. In addition to including well-recognized results of variational analysis and optimization, the book includes a number of new and important ones Includes practical examples

Analele științifice ale Universității "Al. I. Cuza" din Iași

The present monograph is intended to provide a comprehensive and accessible introduction to the optimization of elliptic systems. This area of mathematical research, which has many important applications in science and technology. has experienced an impressive development during the past two decades. There are already many good textbooks dealing with various aspects of optimal design problems. In this regard, we refer to the works of Pironneau [1984], Haslinger and Neittaanmaki [1988], [1996], Sokolowski and Zolksio [1992], Litvinov [2000], Allaire [2001], Mohammadi and Pironneau [2001], Delfour and Zolksio [2001], and Makinen and Haslinger [2003]. Already Lions [I9681 devoted a major part of his classical monograph on the optimal control of partial differential equations to the optimization of elliptic systems. Let us also mention that even the very first known problem of the calculus of variations, the brachistochrone studied by Bernoulli back in 1696. is in fact a shape optimization problem. The natural richness of this mathematical research subject, as well as the extremely large field of possible applications, has created the unusual situation that although many important results and methods have already been est- lished, there are still pressing unsolved questions. In this monograph, we aim to address some of these open problems; as a consequence, there is only a minor overlap with the textbooks already existing in the field.

Shape Optimization And Optimal Design

Optimization in Solving Elliptic Problems focuses on one of the most interesting and challenging problems of computational mathematics - the optimization of numerical algorithms for solving elliptic problems. It presents detailed discussions of how asymptotically optimal algorithms may be applied to elliptic problems to obtain numerical solutions meeting certain specified requirements. Beginning with an outline of the fundamental principles of numerical methods, this book describes how to construct special modifications of classical finite element methods such that for the arising grid systems, asymptotically optimal iterative methods can be applied. Optimization in Solving Elliptic Problems describes the construction of computational algorithms resulting in the required accuracy of a solution and having a pre-determined computational complexity. Construction of asymptotically optimal algorithms is demonstrated for multi-dimensional elliptic boundary value problems under general conditions. In addition, algorithms are developed for eigenvalue problems and Navier-Stokes problems. The development of these algorithms is based on detailed discussions of topics that include accuracy estimates of projective and difference methods, topologically equivalent grids and triangulations, general theorems on convergence of iterative methods, mixed finite element methods for Stokes-type problems, methods of solving fourth-order problems, and methods for solving classical elasticity problems. Furthermore, the text provides methods for managing basic iterative methods such as domain decomposition and multigrid methods. These methods, clearly developed and explained in the text, may be used to develop algorithms for solving applied elliptic problems. The mathematics necessary to understand the development of such algorithms is provided in the introductory material within the text, and common specifications of algorithms that have been developed for typical problems in mathema

Computational Optimization of Systems Governed by Partial Differential Equations

The present monograph is intended to provide a comprehensive and accessible introduction to the optimization of elliptic systems. This area of mathematical research, which has many important applications in science and technology. has experienced an impressive development during the past two decades. There are already many good textbooks dealing with various aspects of optimal design problems. In this regard, we refer to the works of Pironneau [1984], Haslinger and Neittaanmaki [1988], [1996], Sokolowski and Zolksio [1992], Litvinov [2000], Allaire [2001], Mohammadi and Pironneau [2001], Delfour and Zolksio [2001], and Makinen and Haslinger [2003]. Already Lions [I9681 devoted a major part of his classical monograph on the optimal control of partial differential equations to the optimization of elliptic systems. Let us also mention that even the very first known problem of the calculus of variations, the brachistochrone studied by Bernoulli back in 1696. is in fact a shape optimization problem. The natural richness of this mathematical research subject, as well as the extremely large field of possible applications, has created the unusual situation that although many important results and methods have already been est- lished, there are still pressing unsolved questions. In this monograph, we aim to address some of these open problems; as a consequence, there is only a minor overlap with the textbooks already existing in the field.

Discretization-Optimization Methods for Nonlinear Elliptic Optimal Control Problems with State Constraints

rd This book constitutes a collection of extended versions of papers presented at the 23 IFIP TC7 Conference on System Modeling and Optimization, which was held in C- cow, Poland, on July 23–27, 2007. It contains 7 plenary and 22 contributed articles, the latter selected via a peer reviewing process. Most of the papers are concerned with optimization and optimal control. Some of them deal with practical issues, e. g. , p- formance-based design for seismic risk reduction, or evolutionary optimization in structural engineering. Many contributions concern optimization of infini- dimensional systems, ranging from a general overview of the variational analysis, through optimization and sensitivity analysis of PDE systems, to optimal control of neutral systems. A significant group of papers is devoted to shape analysis and opti- zation. Sufficient optimality conditions for ODE problems, and stochastic control methods applied to mathematical finance, are also investigated. The remaining papers are on mathematical programming, modeling, and information technology. The conference was the 23rd event in the series of such meetings biennially org- ized under the auspices of the Seventh Technical Committee “Systems Modeling and Optimization” of the International Federation for Information Processing (IFIP TC7).

Approximation and Optimization of Discrete and Differential Inclusions

The book is devoted to nonlinear mathematical problems encountered in modern structural design: shape optimization and «smart» materials. In the first part a method of sensitivity calculations for singular elliptic problems is proposed and its correctness as well as some properties are proved. Examples of applications are given. The second part concerns structures reinforced with shape memory materials. The existence, uniqueness and differentiability properties of solutions to dynamic problems are proved, based on the Landau-Devonshire shape memory effect model. Finally, an approach to the description of noncristalline shape memory materials with preliminary existence results is presented.

Numerical Analysis and Optimization

This conference, organized jointly by UTC and INRIA, is the biennial general conference of the IFIP Technical Committee 7 (System Modelling and Optimization), and reflects the activity of its members and working groups. These proceedings contain a collection of papers (82 from the more than 400 submitted) as well as the plenary lectures presented at the conference.

Optimization in Elliptic Problems with Applications to Mechanics of Deformable Bodies and Fluid Mechanics

Constrained Optimization and Optimal Control for Partial Differential Equations

The topological derivative is defined as the first term (correction) of the asymptotic expansion of a given shape functional with respect to a small parameter that measures the size of singular domain perturbations, such as holes, inclusions, defects, source-terms and cracks. Over the last decade, topological asymptotic analysis has become a broad, rich and fascinating research area from both theoretical and numerical standpoints. It has applications in many different fields such as shape and topology optimization, inverse problems, imaging processing and mechanical modeling including synthesis and/or optimal design of microstructures, fracture mechanics sensitivity analysis and damage evolution modeling. Since there is no monograph on the subject at present, the authors provide here the first account of the theory which combines classical sensitivity analysis in shape optimization with asymptotic analysis by means of compound asymptotic expansions for elliptic boundary value problems. This book is intended for researchers and graduate students in applied mathematics and computational mechanics interested in any aspect of topological asymptotic analysis. In particular, it can be adopted as a textbook in advanced courses on the subject and shall be useful for readers interested on the mathematical aspects of topological asymptotic analysis as well as on applications of topological derivatives in computation mechanics.

Optimization

Robust design—that is, managing design uncertainties such as model uncertainty or parametric uncertainty—is the often unpleasant issue crucial in much multidisciplinary optimal design work. Recently, there has been enormous practical interest in strategies for applying optimization tools to the development of robust solutions and designs in several areas, including aerodynamics, the integration of sensing (e.g., laser radars, vision-based systems, and millimeter-wave radars) and control, cooperative control with poorly modeled uncertainty, cascading failures in military and civilian applications, multi-mode seekers/sensor fusion, and data association problems and tracking systems. The contributions to this book explore these different strategies. The expression "optimization-directed” in this book’s title is meant to suggest that the focus is not agonizing over whether optimization strategies identify a true global optimum, but rather whether these strategies make significant design improvements.

Studia Universitatis Babeș-Bolyai

A collection of articles summarizing the state of knowledge in a large portion of modern homotopy theory. This welcome reference for many new results and recent methods is addressed to all mathematicians interested in homotopy theory and in geometric aspects of group theory.

Semismooth Newton Methods for Variational Inequalities and Constrained Optimization Problems in Function Spaces

The 9th Belgian-French-German Conference on Optimization has been held in Namur (Belgium) on September 7-11, 1998. This volume is a collection of papers presented at this Conference. Originally, this Conference was a French-German

Conference but this year, in accordance with the organizers' wishes, a third country, Belgium, has joined the founding members of the Conference. Hence the name: Belgian French-German Conference on Optimization. Since the very beginning, the purpose of these Conferences has been to bring together researchers working in the area of Optimization and partic ularly to encourage young researchers to present their work. Most of the participants come from the organizing countries. However the general ten dancy is to invite outside researchers to attend the meeting. So this year, among the 101 participants at this Conference, twenty researchers came from other countries. The general theme of the Conference is everything that concerns the area of Optimization without specification of particular topics. So theoretical as pects of Optimization, in addition to applications and algorithms of Opti mization, will be developed. However, and this point was very important for the organizers, the Conference must retain its convivial character. No more than two parallel sessions are organized. This would allow useful contacts between researchers to be promoted. The editors express their sincere thanks to all those who took part in this Conference. Their invaluable discussions have made this volume possible.

Large-Scale PDE-Constrained Optimization

This book contains the results in numerical analysis and optimization presented at the ECCOMAS thematic conference “Computational Analysis and Optimization” (CAO 2011) held in Jyväskylä, Finland, June 9–11, 2011. Both the conference and this volume are dedicated to Professor Pekka Neittaanmäki on the occasion of his sixtieth birthday. It consists of five parts that are closely related to his scientific activities and interests: Numerical Methods for Nonlinear Problems; Reliable Methods for Computer Simulation; Analysis of Noised and Uncertain Data; Optimization Methods; Mathematical Models Generated by Modern Technological Problems. The book also includes a short biography of Professor Neittaanmäki.

Elliptic Problems in Nonsmooth Domains

Optimization, simulation and control play an increasingly important role in science and industry. Because of their numerous applications in various disciplines, research in these areas is accelerating at a rapid pace. This volume brings together the latest developments in these areas of research as well as presents applications of these results to a wide range of real-world problems. The book is composed of invited contributions by experts from around the world who work to develop and apply new optimization, simulation and control techniques either at a theoretical level or in practice. Some key topics presented include: equilibrium problems, multi-objective optimization, variational inequalities, stochastic processes, numerical analysis, optimization in signal processing, and various other interdisciplinary applications. This volume can serve as a useful resource for researchers, practitioners, and advanced graduate students of mathematics and engineering working in research areas where results in optimization, simulation and control can be applied.

Optimization in Elliptic Problems with Applications to Mechanics of Deformable Bodies and Fluid Mechanics

The 21 self-contained chapters in this book, include recent developments in several optimization-related topics such as decision theory, linear programming, turnpike theory, duality theory, convex analysis, and queueing theory. This work will be a valuable tool not only to specialists interested in the technical detail and various applications presented, but also to researchers interested in building upon the book’s theoretical results.

Optimization with PDE Constraints

Frontiers in PDE-Constrained Optimization

The contributions appearing in this book give an overview of recent research done in optimization and related areas, such as optimal control, calculus of variations, and game theory. They do not only address abstract issues of optimization theory, but are also concerned with the modeling and computer resolution of specific optimization problems arising in industry and applied sciences.