Aerodynamic Shape Optimization With The Adjoint Method

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The Variational Method for Aerodynamic Optimization Using the Navier-Stokes Equations - 1997
This report describes the formulation of an aerodynamic shape design methodology using a compressible viscous flow model based on the Reynolds Averaged Navier Stokes equations. The aerodynamic shape is described by a set of geometrical design variables. The design problem is formulated as an optimization problem stated in terms of an aerodynamic objective functional which has to be minimized. The design scheme employs a gradient based optimization algorithm in order to obtain the optimum values of the design variables. The gradient of the aerodynamic functional with respect to the design variables is computed by means of the variational method, which requires the solution of an adjoint problem. The formulation of the adjoint problem is described which leads to a set of adjoint equations and boundary conditions. Using the flow variables and the adjoint variables, an expression for the gradient has been constructed. Computational results are presented for an inverse problem of an airfoil. It will be shown that, starting from an initial geometry of the NACA 0012 airfoil, the target pressure distribution and geometry of a best fit of the RAE 2822 airfoil in a transonic flow condition has been reconstructed successfully.

Marine Design XIII, Volume 1 - Pentti Kujala 2018-06-04
This is volume 1 of a 2-volume set. Marine Design XIII collects the contributions to the 13th International Marine Design Conference (IMDC 2018, Espoo, Finland, 10-14 June 2018). The aim of this IMDC series of conferences is to promote all aspects of marine design as an engineering discipline. The focus is on key design challenges and opportunities in the area of current maritime technologies and markets, with special emphasis on: • Challenges in merging ship design and marine applications of experience-based industrial design • Digitalisation as technological enabler for stronger link between efficient design, operations and maintenance in future • Emerging technologies and their impact on future designs • Cruise ship and icebreaker designs including fleet compositions to meet new market demands To reflect on the conference focus, Marine Design XIII covers the following research topic series: •State of art ship design principles - education, design methodology, structural design, hydrodynamic design; •Cutting edge ship designs and operations - ship concept design, risk and safety, arctic design, autonomous ships; •Energy efficiency and propulsions - energy efficiency, hull form design, propulsion equipment design; •Wider marine designs and practices - navy ships, offshore and wind farms and production. Marine Design XIII contains 2 state-of-the-art reports on design methodologies and cruise ships design, and 4 keynote papers on new directions for vessel design practices and tools, digital maritime traffic, naval ship designs, and new tanker design for arctic. Marine Design XIII will be of interest to academics and professionals in maritime technologies and marine design.

Advances in Energy Science and Equipment Engineering - Shiquan Zhou 2015-11-05
Advances in Energy Equipment Science and Engineering contains selected papers from the 2015 International Conference on Energy Equipment Science and Engineering (ICEESE 2015, Guangzhou, China, 30-31 May 2015). The topics covered include:- Advanced design technology- Energy and chemical engineering- Energy and environmental engineering- Energy scien

Parallel Computational Fluid Dynamics 2007 - Ismail H. Tuncer 2009-04-21
At the 19th Annual Conference on Parallel Computational Fluid Dynamics held in Antalya, Turkey, in May 2007, the most recent developments and implementations of large-scale and grid computing were presented. This book, comprised of the invited and selected papers of this conference, details those advances, which are of particular interest to CFD and CFD-related communities. It also offers the results

related to applications of various scientific and engineering problems involving flows and flow-related topics. Intended for CFD researchers and graduate students, this book is a state-of-the-art presentation of the relevant methodology and implementation techniques of large-scale computing.

Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences - António Gaspar-Cunha 2020-11-23
This book presents improved and extended versions of selected papers from EUROGEN 2019, a conference with interest on developing or applying evolutionary and deterministic methods in optimization of design and emphasizing on industrial and societal applications.

Mechanics and Mechatronics (ICMM2015) - A Mehran Shahhosseini 2015-11-02
This proceedings brings together one hundred and fifty two selected papers presented at the 2015 International Conference on Mechanics and Mechatronics (ICMM 2015), which was held in Changsha, Hunan, China, during March 13–15 2015. ICMM 2015 focuses on 7 main areas — Applied Mechanics, Mechanical Engineering, Instrumentation, Automation, and Robotics, Computer Information Processing, and Civil Engineering. Experts in this field from eight countries, including China, South Korea, Taiwan, Japan, Malaysia, Hong Kong, Indonesia and Saudi Arabia, contributed to the collection of research results and developments. ICMM 2015 provides an excellent international platform for researchers to share their knowledge and results in theory, methodology and applications of Applied Mechanics and Mechatronics. All papers selected to this proceedings were subject to a rigorous peer-review process by at least two independent peers. The papers are selected based on innovation, organization, and quality of presentation. Contents:Applied MechanicsMechanical Engineering and Manufacturing TechnologyMechatronics and Electrical EngineeringTechnology and Method for Measurement, Test, Detection and MonitoringAutomation, Control Engineering and RoboticsComputer Information Processing TechnologyCivil Engineering Technology Readership: Researchers and professionals in mechanical engineering, control, electrical & electronic engineering and robotics and automated systems. Keywords:Applied Mechanics;Mechanical Engineering;Instrumentation;Automation;Robotics;Computer Information Processing;Civil Engineering

Evolutionary and Deterministic Methods for Design Optimization and Control With Applications to Industrial and Societal Problems - Esther Andrés-Pérez 2018-09-06
This book contains thirty-five selected papers presented at the International Conference on Evolutionary and Deterministic Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems (EUROGEN 2017). This was one of the Thematic Conferences of the European Community on Computational Methods in Applied Sciences (ECCOMAS). Topics treated in the various chapters reflect the state of the art in theoretical and numerical methods and tools for optimization, and engineering design and societal applications. The volume focuses particularly on intelligent systems for multidisciplinary design optimization (mdo) problems based on multi-hybridized software, adjoint-based and one-shot methods, uncertainty quantification and optimization, multidisciplinary design optimization, applications of game theory to industrial optimization problems, applications in structural and civil engineering optimum design and surrogate models based optimization methods in aerodynamic design.

Handbook of Wind Energy Aerodynamics - Bernhard Stoevesandt 2022-08-04
This handbook provides both a comprehensive overview and deep insights on the state-of-the-art methods used in wind turbine aerodynamics, as well as their advantages and limits. The focus of this

work is specifically on wind turbines, where the aerodynamics are different from that of other fields due to the turbulent wind fields they face and the resultant differences in structural requirements. It gives a complete picture of research in the field, taking into account the different approaches which are applied. This book would be useful to professionals, academics, researchers and students working in the field.

Computational Algorithms for High-fidelity Multidisciplinary Design of Complex Aerospace Systems - Antony Jameson 2005

IUTAM Symposium Transsonicum IV - H. Sobieczky 2012-12-06 "Symposium Transsonicum" was founded by Klaus Oswatitsch four decades ago when there was clearly a need for a systematic treatment of flow problems in the higher speed regime in aeronautics. The first conference in 1962 brought together scientists concerned with fundamental problems involving the sonic flow speed regime. Results of the conference provided an understanding of some basic tran sonic phenomena by proposing mathematical methods that allowed for the de velopment of practical calculations. The "Transonic Controversy" (about shock free flows) was still an open issue after this meeting. In 1975 the second symposium was held, by then there was much understanding in how to avoid shocks in a steady plane flow to be designed, but still very little was known in unsteady phenomena due to a lack of elucidating experiments. A third meeting in 1988 reflected the availability oflarger computers which allowed the numerical analysis of flows with shocks to a reasonable accuracy. Because we are trying to keep Oswatitsch's heritage in science alive especially in Gottingen, we were asked by the aerospace research community to organize another symposium. Much had been achieved already in the knowledge, techno logy and applications in transonics, so IUT AM had to be convinced that a fourth meeting would not just be a reunion of old friends reminiscing some scientific past. The scientific committee greatly supported my efforts to invite scientists ac tively working in transonic problems which still pose substantial difficulties to ae rospace and turbomachinery industry.

Computational Optimization, Methods and Algorithms - Slawomir Koziel 2011-06-17 Computational optimization is an important paradigm with a wide range of applications. In virtually all branches of engineering and industry, we almost always try to optimize something - whether to minimize the cost and energy consumption, or to maximize profits, outputs, performance and efficiency. In many cases, this search for optimality is challenging, either because of the high computational cost of evaluating objectives and constraints, or because of the nonlinearity, multimodality, discontinuity and uncertainty of the problem functions in the real-world systems. Another complication is that most problems are often NP-hard, that is, the solution time for finding the optimum increases exponentially with the problem size. The development of efficient algorithms and specialized techniques that address these difficulties is of primary importance for contemporary engineering, science and industry. This book consists of 12 self-contained chapters, contributed from worldwide experts who are working in these exciting areas. The book strives to review and discuss the latest developments concerning optimization and modelling with a focus on methods and algorithms for computational optimization. It also covers well-chosen, real-world applications in science, engineering and industry. Main topics include derivative-free optimization, multi-objective evolutionary algorithms, surrogate-based methods, maximum simulated likelihood estimation, support vector machines, and metaheuristic algorithms. Application case studies include aerodynamic shape optimization, microwave engineering, black-box optimization, classification, economics, inventory optimization and structural optimization. This graduate level book can serve as an excellent reference for lecturers, researchers and students in computational science, engineering and industry.

Foundations of Optimization - Douglass J. Wilde 1967

NASA's Contributions to Aeronautics - 2010 Two-volume collection of case studies on aspects of NACA-NASA research by noted engineers, airmen, historians, museum curators, journalists, and independent scholars. Explores various aspects of how NACA-NASA research took aeronautics from the subsonic to the hypersonic era.-publisher description.

New Results in Numerical and Experimental Fluid Mechanics VIII - Andreas Dillmann 2012-12-27 This volume contains the contributions to the 17th Symposium of STAB (German Aerospace Aerodynamics Association). STAB includes German scientists and engineers from universities, research establishments and

industry doing research and project work in numerical and experimental fluid mechanics and aerodynamics, mainly for aerospace but also for other applications. Many of the contributions collected in this book present results from national and European Community sponsored projects. This volume gives a broad overview of the ongoing work in this field in Germany and spans a wide range of topics: airplane aerodynamics, multidisciplinary optimization and new configurations, hypersonic flows and aerothermodynamics, flow control (drag reduction and laminar flow control), rotorcraft aerodynamics, aeroelasticity and structural dynamics, numerical simulation, experimental simulation and test techniques, aeroacoustics as well as the new fields of biomedical flows, convective flows, aerodynamics and acoustics of high-speed trains.

Fluid-Structure-Sound Interactions and Control - Marianna Braza 2021-05-05 This book contains a thorough and unique record of recent advances in the important scientific fields fluid–structure interaction, acoustics and control of priority interest in the academic community and also in an industrial context regarding new engineering designs. It updates advances in these fields by presenting state-of-the-art developments and achievements since the previous Book published by Springer in 2018 after the 4th FSSIC Symposium. This book is unique within the related literature investigating advances in these fields because it addresses them in a complementary way and thereby enhances cross-fertilization between them, whereas other books treat these fields separately.

MEGADESIGN and MegaOpt - German Initiatives for Aerodynamic Simulation and Optimization in Aircraft Design - Norbert Kroll 2009-11-18 This volume contains results of the German CFD initiative MEGADESIGN which combines CFD development activities from DLR, universities and aircraft industry. Based on the DLR flow solvers FLOWer and TAU the main objectives of the four-years project is to ensure the prediction accuracy with a guaranteed error bandwidth for certain aircraft configurations at design conditions, to reduce the simulation turn-around time for large-scale applications significantly, to improve the reliability of the flow solvers for full aircraft configurations in the complete flight regime, to extend the flow solvers to allow for multidisciplinary simulations and to establish numerical shape optimization as a vital tool within the aircraft design process. This volume highlights recent improvements and enhancements of the flow solvers as well as new developments with respect to aerodynamic and multidisciplinary shape optimization. Improved numerical simulation capabilities are demonstrated by several industrial applications.

The Best of COMVEC 2016 Select Technical Papers from the SAE Commercial Vehicle Engineering Congress - Kevin Jost 2016-09-24 This special collection highlights some of the best technical papers that represent the breadth of the entire technical program. Leading industry perspectives are reflected by the corporate contributions that are included in this group, along with a specific focus on connectivity, the theme of the 2016 event. The commercial vehicle industry has always been focused on improving efficiency. These ten characteristic offerings present cutting-edge trends, technologies, and solutions that provide greater benefit and the application of knowledge to solve problems and guide future innovation. These studies are presented by experts from industrial, governmental, and academic partners on topics that include: • Autonomous commercial vehicles • Computational fluid dynamics and aerodynamics for heavy-duty, on-road applications • Fuel and emissions efficiency of medium-duty powertrain configurations • Intelligently controlled air-suspension systems • Improving total cost of ownership by gains in thermal efficiency • New simulation and testing techniques enabling next generation commercial vehicle technology The leadership team has focused on bringing in a broad mixture of participants to COMVEC to discuss current technologies and the future challenges of the commercial vehicle industry. This first of its kind special publication draws on the strength of the event's program and features ten of the best technical papers from the SAE International Congress.

Large-Scale PDE-Constrained Optimization in Applications - Subhendu Bikash Hazra 2009-12-16 With continuous development of modern computing hardware and applicable - merical methods, computational ?uid dynamics (CFD) has reached certain level of maturity so that it is being used routinely by scientists and engineers for ?uid ?ow analysis. Since most of the real-life applications involve some kind of optimization, it has been natural to extend the use of CFD tools from ?ow simulation to simu- tion based optimization. However, the transition from simulation to optimization is not straight forward, it requires proper interaction between advanced

CFD meth- ologies and state-of-the-art optimization algorithms. The ultimate goal is to achieve optimal solution at the cost of few ?ow solutions. There is growing number of - search activities to achieve this goal. This book results from my work done on simulation based optimization problems at the Department of Mathematics, University of Trier, and reported in my postd- toral thesis ("Habilitationsschrift") accepted by the Faculty-IV of this University in 2008. The focus of the work has been to develop mathematical methods and - gorithms which lead to ef?cient and high performance computational techniques to solve such optimization problems in real-life applications. Systematic development of the methods and algorithms are presented here. Practical aspects of implemen- tions are discussed at each level as the complexity of the problems increase, suppo- ing with enough number of computational examples.

Computational Methods for Optimal Design and Control - J. Borggaard 2012-12-06
This volume contains the proceedings of the Second International Workshop on Optimal Design and Control, held in Arlington, Virginia, 30 September-3 Octo ber, 1997. The First Workshop was held in Blacksburg, Virginia in 1994. The proceedings of that meeting also appeared in the Birkhauser series on Progress in Systems and Control Theory and may be obtained through Birkhauser. These workshops were sponsored by the Air Force Office of Scientific Re search through the Center for Optimal Design and Control (CODAC) at Vrrginia Tech. The meetings provided a forum for the exchange of new ideas and were designed to bring together diverse viewpoints and to highlight new applications. The primary goal of the workshops was to assess the current status of research and to analyze future directions in optimization based design and control. The present volume contains the technical papers presented at the Second Workshop. More than 65 participants from 6 countries attended the meeting and contributed to its success. It has long been recognized that many modern optimal design problems are best viewed as variational and optimal control problems. Indeed, the famous problem of determining the body of revolution that produces a minimum drag nose shape in hypersonic How was first proposed by Newton in 1686. Optimal control approaches to design can provide theoretical and computational insight into these problems. This volume contains a number of papers which deal with computational aspects of optimal control.

The Proceedings of the 2018 Asia-Pacific International Symposium on Aerospace Technology (APISAT 2018) - Xinguo Zhang 2019-06-08
This book is a compilation of peer-reviewed papers from the 2018 Asia-Pacific International Symposium on Aerospace Technology (APISAT 2018). The symposium is a common endeavour between the four national aerospace societies in China, Australia, Korea and Japan, namely, the Chinese Society of Aeronautics and Astronautics (CSAA), Royal Aeronautical Society Australian Division (RAeS Australian Division), the Korean Society for Aeronautical and Space Sciences (KSAS) and the Japan Society for Aeronautical and Space Sciences (JSASS). APISAT is an annual event initiated in 2009 to provide an opportunity for researchers and engineers from Asia-Pacific countries to discuss current and future advanced topics in aeronautical and space engineering.

Advances in Mechanical Engineering and Material Science - Ketul C. Popat 2022-04-22
This book presents select proceedings of the 1st International Conference on Advances in Mechanical Engineering and Material Science (ICAMEMS 2022). It discusses about the diverse technological advancements, innovations, and achievements in the areas of mechanical engineering and material science. It also covers the developments and challenges in the field of machine design, manufacturing, thermal and fluid engineering. Important topics covered in the conference include advanced manufacturing processes, machining, product design and development, mechatronics and robotics, non-conventional energy resources, green energy and energy harvesting, tribology, materials and characterization. The book also discusses advanced research areas in material science such as smart materials, bio-materials and advanced energy materials. Given the contents, the book will be a valuable reference for students, researchers and industrialists interested in advanced research areas of mechanical engineering and material science.

MEGAFLOW - Numerical Flow Simulation for Aircraft Design - Norbert Kroll 2006-10-02
The aerospace industry increasingly relies on advanced numerical simulation tools in the early design phase. This volume provides the results of a German initiative which combines many of the CFD

development activities from the German Aerospace Center (DLR), universities, and aircraft industry. Numerical algorithms for structured and hybrid Navier-Stokes solvers are presented in detail. The capabilities of the software for complex industrial applications are demonstrated.

Frontiers of Computational Fluid Dynamics 2006 - David A. Caughey 2005
The series of volumes to which this book belongs honors contributors who have made a major impact in computational fluid dynamics. This fourth volume in the series is dedicated to David Caughey on the occasion of his 60th birthday. The first volume was published in 1994 and was dedicated to Prof Antony Jameson. The second, dedicated to Earl Murman, was published in 1998. The third volume was dedicated to Robert MacCormack in 2002.Written by leading researchers from academia, government laboratories, and industry, the contributions in this volume present descriptions of the latest developments in techniques for numerical analysis of fluid flow problems, as well as applications to important problems in industry.

Uncertainty Management for Robust Industrial Design in Aeronautics - Charles Hirsch 2018-07-21
This book covers cutting-edge findings related to uncertainty quantification and optimization under uncertainties (i.e. robust and reliable optimization), with a special emphasis on aeronautics and turbomachinery, although not limited to these fields. It describes new methods for uncertainty quantification, such as non-intrusive polynomial chaos, collocation methods, perturbation methods, as well as adjoint based and multi-level Monte Carlo methods. It includes methods for characterization of most influential uncertainties, as well as formulations for robust and reliable design optimization. A distinctive element of the book is the unique collection of test cases with prescribed uncertainties, which are representative of the current engineering practice of the industrial consortium partners involved in UMRIDA, a level 1 collaborative project within the European Commission's Seventh Framework Programme (FP7). All developed methods are benchmarked against these industrial challenges. Moreover, the book includes a section dedicated to Best Practice Guidelines for uncertainty quantification and robust design optimization, summarizing the findings obtained by the consortium members within the UMRIDA project. All in all, the book offers a authoritative guide to cutting-edge methodologies for uncertainty management in engineering design, covers a wide range of applications and discusses new ideas for future research and interdisciplinary collaborations.

Aerodynamic Drag Reduction Technologies - Dragnet European Drag Reduction Conference 2001-05-22
This volume contains the proceedings of the CEAS/DragNet European Drag Reduction Conference 2000. The conference addressed the recent advances in all areas of drag reduction research, development, validation and demonstration including laminar flow technology, adaptive wing concepts, turbulent and induced drag reduction, separation control and supersonic flow aspects. This volume is of particular interest to engineers, scientists and students working in the aeronautics industry, research establishments or academia.

Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences - Edmondo Minisci 2018-07-02
This volume presents up-to-date material on the state of the art in evolutionary and deterministic methods for design, optimization and control with applications to industrial and societal problems from Europe, Asia, and America. EUROGEN 2015 was the 11th of a series of International Conferences devoted to bringing together specialists from universities, research institutions and industries developing or applying evolutionary and deterministic methods in design optimization, with emphasis on solving industrial and societal problems. The conference was organised around a number of parallel symposia, regular sessions, and keynote lectures focused on surrogate-based optimization in aerodynamic design, adjoint methods for steady & unsteady optimization, multi-disciplinary design optimization, holistic optimization in marine design, game strategies combined with evolutionary computation, optimization under uncertainty, topology optimization, optimal planning, shape optimization, and production scheduling.

New Results in Numerical and Experimental Fluid Mechanics X - Andreas Dillmann 2016-03-28
This book presents contributions to the 19th biannual symposium of the German Aerospace Aerodynamics Association (STAB) and the German Society for Aeronautics and Astronautics (DGLR). The individual chapters reflect ongoing research conducted by the STAB members in the field of

numerical and experimental fluid mechanics and aerodynamics, mainly for (but not limited to) aerospace applications, and cover both nationally and EC-funded projects. Special emphasis is given to collaborative research projects conducted by German scientists and engineers from universities, research-establishments and industries. By addressing a number of cutting-edge applications, together with the relevant physical and mathematics fundamentals, the book provides readers with a comprehensive overview of the current research work in the field. Though the book's primary emphasis is on the aerospace context, it also addresses further important applications, e.g. in ground transportation and energy.

NASA's Contributions to Aeronautics: Aerodynamics, structures, propulsion, controls - 2010
Two-volume collection of case studies on aspects of NACA-NASA research by noted engineers, airmen, historians, museum curators, journalists, and independent scholars. Explores various aspects of how NACA-NASA research took aeronautics from the subsonic to the hypersonic era.-publisher description.

Optimization and Computational Fluid Dynamics - Dominique Thévenin 2008-01-08
The numerical optimization of practical applications has been an issue of major importance for the last 10 years. It allows us to explore reliable non-trivial configurations, differing widely from all known solutions. The purpose of this book is to introduce the state-of-the-art concerning this issue and many complementary applications are presented.

Flow-Based Optimization of Products or Devices - Nils Tångefjord Basse 2020-11-13
Flow-based optimization of products and devices is an immature field compared to the corresponding topology optimization based on solid mechanics. However, it is an essential part of component development with both internal and/or external flow. The aim of this book is two-fold: (i) to provide state-of-the-art examples of flow-based optimization and (ii) to present a review of topology optimization for fluid-based problems.

OpenFOAM® - J. Miguel Nóbrega 2019-01-24
This book contains selected papers of the 11th OpenFOAM® Workshop that was held in Guimarães, Portugal, June 26 - 30, 2016. The 11th OpenFOAM® Workshop had more than 140 technical/scientific presentations and 30 courses, and was attended by circa 300 individuals, representing 180 institutions and 30 countries, from all continents. The OpenFOAM® Workshop provided a forum for researchers, industrial users, software developers, consultants and academics working with OpenFOAM® technology. The central part of the Workshop was the two-day conference, where presentations and posters on industrial applications and academic research were shown. OpenFOAM® (Open Source Field Operation and Manipulation) is a free, open source computational toolbox that has a larger user base across most areas of engineering and science, from both commercial and academic organizations. As a technology, OpenFOAM® provides an extensive range of features to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to solid dynamics and electromagnetics, among several others. Additionally, the OpenFOAM technology offers complete freedom to customize and extend its functionalities.

Simulation-Driven Aerodynamic Design Using Variable-Fidelity Models - Leifur Leifsson 2015-01-09
Computer simulations is a fundamental tool of the design process in many engineering disciplines including aerospace engineering. However, although high-fidelity numerical models are accurate, they can be computationally expensive with evaluation time for a single design as long as hours, days or even weeks. Simulation-driven design using conventional optimization techniques may be therefore prohibitive. This book explores the alternative: performing computationally efficient design using surrogate-based optimization, where the high-fidelity model is replaced by its computationally cheap but still reasonably accurate representation: a surrogate. The emphasis is on physics-based surrogates. Application-wise, the focus is on aerodynamics and the methods and techniques described in the book are demonstrated using aerodynamic shape optimization cases. Applications in other engineering fields are also demonstrated. State-of-the-art techniques and a depth of coverage never published before make this a unique and essential book for all researchers working in aerospace and other engineering areas and dealing with optimization, computationally expensive design problems, and simulation-driven design. Contents:Motivation and Problem Formulation:IntroductionAerodynamic Shape OptimizationOptimization Techniques:Simulation-Driven Design: Direct MethodsSurrogate-Based OptimizationSBO with Approximation-Based SurrogatesSBO with Physics-Based SurrogatesAerodynamics Modeling:Geometry ParameterizationHigh-Fidelity Aerodynamic ModelsLow-Fidelity Aerodynamics ModelsApplications:Transonic Airfoil Shape DesignTransonic Wing Shape DesignSubsonic Shape DesignSelected Applications of Surrogate-Based Optimization in Other AreasSurrogate-Based Optimization with MATLABConclusion:Practical Aspects of Variable-Fidelity Design Readership: Graduate students and researchers in the field of engineering, in particular, aerospace engineering. Key Features:Gathers a number of relevant techniques that were never compiled in one publication before, and certain state-of-the-art techniques have never been published in book formCompact and self-contained introduction to the area of surrogate-based optimization and variable-fidelity optimizationAt present, this is the only book available on the market that offers coverage of variable-fidelity optimization methodsKeywords:Aerodynamic Shape Optimization;Computational Fluid Dynamics (CFD);Surrogate Modeling;Surrogate-based Optimization;Variable-fidelity Simulations;Simulation-driven Design

Computational Fluid Dynamics 2006 - Herman Deconinck 2009-08-04
The International Conference on Computational Fluid Dynamics (ICCFD) is the merger of the International Conference on Numerical Methods in Fluid Dynamics, ICNMFD (since 1969) and International Symposium on Computational Fluid Dynamics, ISCFD (since 1985). It is held every two years and brings together physicists, mathematicians and engineers to review and share recent advances in mathematical and computational techniques for modeling fluid dynamics. The proceedings of the 2006 conference (ICCFD4) held in Gent, Belgium, contain a selection of refereed contributions and are meant to serve as a source of reference for all those interested in the state of the art in computational fluid mechanics.

Optimal Shape Design - B. Kawohl 2000-11-16
Optimal Shape Design is concerned with the optimization of some performance criterion dependent (besides the constraints of the problem) on the "shape" of some region. The main topics covered are: the optimal design of a geometrical object, for instance a wing, moving in a fluid; the optimal shape of a region (a harbor), given suitable constraints on the size of the entrance to the harbor, subject to incoming waves; the optimal design of some electrical device subject to constraints on the performance. The aim is to show that Optimal Shape Design, besides its interesting industrial applications, possesses nontrivial mathematical aspects. The main theoretical tools developed here are the homogenization method and domain variations in PDE. The style is mathematically rigorous, but specifically oriented towards applications, and it is intended for both pure and applied mathematicians. The reader is required to know classical PDE theory and basic functional analysis.

Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences - David Greiner 2014-11-14
This book contains state-of-the-art contributions in the field of evolutionary and deterministic methods for design, optimization and control in engineering and sciences. Specialists have written each of the 34 chapters as extended versions of selected papers presented at the International Conference on Evolutionary and Deterministic Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems (EUROGEN 2013). The conference was one of the Thematic Conferences of the European Community on Computational Methods in Applied Sciences (ECCOMAS). Topics treated in the various chapters are classified in the following sections: theoretical and numerical methods and tools for optimization (theoretical methods and tools; numerical methods and tools) and engineering design and societal applications (turbo machinery; structures, materials and civil engineering; aeronautics and astronautics; societal applications; electrical and electronics applications), focused particularly on intelligent systems for multidisciplinary design optimization (mdo) problems based on multi-hybridized software, adjoint-based and one-shot methods, uncertainty quantification and optimization, multidisciplinary design optimization, applications of game theory to industrial optimization problems, applications in structural and civil engineering optimum design and surrogate models based optimization methods in aerodynamic design.

Recent Progress in Flow Control for Practical Flows - Piotr Doerffer 2017-05-11
This book explores the outcomes on flow control research activities carried out within the framework of two EU-funded projects focused on training-through-research of Marie Sklodowska-Curie doctoral students.

The main goal of the projects described in this monograph is to assess the potential of the passive- and active-flow control methods for reduction of fuel consumption by a helicopter. The research scope encompasses the fields of structural dynamics, fluid flow dynamics, and actuators with control. Research featured in this volume demonstrates an experimental and numerical approach with a strong emphasis on the verification and validation of numerical models. The book is ideal for engineers, students, and researchers interested in the multidisciplinary field of flow control.

NASA's Contributions to Aeronautics, Volume 1, Aerodynamics Structures ,... NASA/SP-2010-570-Vol 1, 2010, * - 2011

ICGG 2020 - Proceedings of the 19th International Conference on Geometry and Graphics - Liang-Yee Cheng 2020-12-01
This book covers various aspects of Geometry and Graphics, from recent achievements on theoretical researches to a wide range of innovative applications, as well as new teaching methodologies and experiences, and reinterpretations and findings about the masterpieces of the past. It is from the 19th International Conference on Geometry and Graphics, which was held in São Paulo, Brazil. The conference started in 1978 and is promoted by the International Society for Geometry and Graphics, which aims to foster international collaboration and stimulate the scientific research and teaching methodology in the fields of Geometry and Graphics. Organized five topics, which are Theoretical Graphics and Geometry; Applied Geometry and Graphics; Engineering Computer Graphics; Graphics Education and Geometry; Graphics in History, the book is intended for the professionals, academics and researchers in architecture, engineering, industrial design, mathematics and arts involved in the multidisciplinary field.

Recent Advances in Intelligent Manufacturing - Shilong Wang 2018-09-04
The three-volume set CCIS 923, CCIS 924, and CCIS 925 constitutes the thoroughly refereed proceedings of the First International Conference on Intelligent Manufacturing and Internet of Things, and of the 5th International Conference on Intelligent Computing for Sustainable Energy and Environment, ICSEE 2018, held in Chongqing, China, in September 2018.The 135 revised full papers presented were carefully reviewed and selected from over 385 submissions.The papers of this volume are organized in topical sections on: digital manufacturing; industrial product design; logistics, production and operation management; manufacturing material; manufacturing optimization; manufacturing process; mechanical transmission system; robotics.

Engineering and Applied Sciences Optimization - Nikos D. Lagaros 2015-05-22
The chapters which appear in this volume are selected studies presented at the First International Conference on Engineering and Applied Sciences Optimization (OPT-i), Kos, Greece, 4-6 June 2014 and works written by friends, former colleagues and students of the late Professor M. G. Karlaftis; all in the area of optimization that he loved and published so much in himself. The subject areas represented here range from structural optimization, logistics, transportation, traffic and telecommunication networks to operational research, metaheuristics, multidisciplinary and multiphysics design optimization, etc. This volume is dedicated to the life and the memory of Professor Matthew G. Karlaftis, who passed away a few hours before he was to give the opening speech at OPT-i. All contributions reflect the warmth and genuine friendship which he enjoyed from his associates and show how much his scientific contribution has been appreciated. He will be greatly missed and it is hoped that this volume will be received as a suitable memorial to his life and achievements.