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Computational Intelligence Paradigms for Optimization Problems Using MATLAB®/SIMULINK®

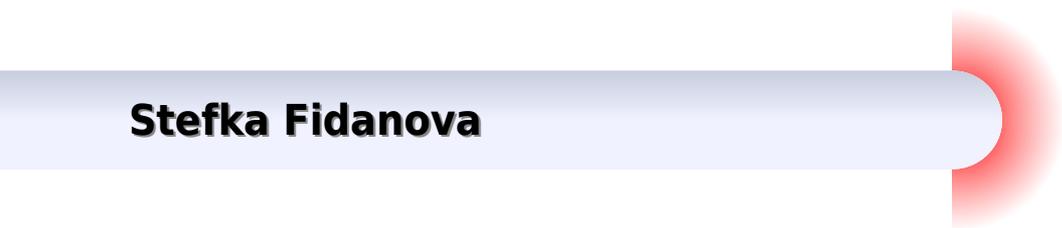


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Computational Intelligence Paradigms For Optimization Problems Using Matlabsimulink

Stefka Fidanova



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Computational Intelligence Paradigms S. Sumathi, Surekha Paneerselvam, 2010-01-05 Offering a wide range of programming examples implemented in MATLAB Computational Intelligence Paradigms Theory and Applications Using MATLAB presents theoretical concepts and a general framework for computational intelligence CI approaches including artificial neural networks fuzzy systems evolutionary computation genetic algorithms and pr

Optimal Power Flow Using FACTS Devices L. Ashok Kumar, K. Mohana Sundaram, 2020-12-03 Optimal Power Flow Using FACTS Devices Soft Computing Techniques develops intelligent algorithms to analyze optimal power flow OPF and to enhance the power transfer capability of the transmission line with reduced congestion By providing elaborate studies on FACTS devices and by using soft computing metaheuristics algorithms such as Firefly Cuckoo Flower Pollination and others this book enables readers to know about algorithms in real time power system applications and damping of subsynchronous resonance SSR oscillations Key features of this book include Offers comprehensive review of FACTS devices and the importance of soft computing techniques for solving OPF Describes the various problems associated with power system operation and control Addresses issues of SSR in power systems and proposes soft techniques for SSR analysis in power systems Demonstrates of the importance of SSR and congestion management using intelligent FACTS devices as part of OPF Covers power systems reliability quality cost effectiveness effects on customer goodwill and pollution limits including the deregulation of markets and different intelligent controllers Optimal Power Flow Using FACTS Devices Soft Computing Techniques is aimed at researchers and professionals in the field of power systems

Software Tools for the Simulation of Electrical Systems L. Ashok Kumar, V. Indragandhi, Uma Y. Maheswari, 2020-08-08 Simulation of Software Tools for Electrical Systems Theory and Practice offers engineers and students what they need to update their understanding of software tools for electric systems along with guidance on a variety of tools on which to model electrical systems from device level to system level The book uses MATLAB PSIM Pspice and PSCAD to discuss how to build simulation models of electrical systems that assist in the practice or implementation of simulation software tools in switches circuits controllers instruments and automation system design In addition the book covers power electronic switches and FACTS controller device simulation model building with the use of Labview and PLC for industrial automation process control monitoring and measurement in electrical systems and hybrid optimization software HOMER is presented for researchers in renewable energy systems Includes interactive content for numerical computation visualization and programming for learning the software tools related to electrical sciences Identifies complex and difficult topics illustrated by useable examples Analyzes the simulation of electrical systems hydraulic and pneumatic systems using different software including MATLAB LABVIEW MULTISIM AUTOSIM and PSCAD

Handbook Of Renewable Energy Technology & Systems Ramesh C Bansal, Ahmed F Zobaa, 2021-08-13 Worldwide the effects of global warming pollution due to power generation from fossil fuels and its depletion have led to the rapid deployment of renewable energy based power generation The leading renewable technologies are wind and photovoltaic PV

systems The incorporation of this generation of technologies has led to the development of a broad array of new methods and tools to integrate renewable generation into power system networks The Handbook of Renewable Energy Technology Systems comprises 22 chapters arranged into four sections which present a comprehensive analysis of various renewable energy based distributed generation DG technologies Aspects of renewable energy covered include wind and photovoltaic power systems and technology micro grids power electronic applications power quality and the protection of renewable distributed generation

Networks of the Future Mahmoud Elkhodr, Qusay F. Hassan, Seyed Shahrestani, 2017-10-16 With the ubiquitous diffusion of the IoT Cloud Computing 5G and other evolved wireless technologies into our daily lives the world will see the Internet of the future expand ever more quickly Driving the progress of communications and connectivity are mobile and wireless technologies including traditional WLANs technologies and low ultra power short and long range technologies These technologies facilitate the communication among the growing number of connected devices leading to the generation of huge volumes of data Processing and analysis of such big data brings about many opportunities as well as many challenges such as those relating to efficient power consumptions security privacy management and quality of service This book is about the technologies opportunities and challenges that can drive and shape the networks of the future Written by established international researchers and experts Networks of the Future answers fundamental and pressing research challenges in the field including architectural shifts concepts mitigation solutions and techniques and key technologies in the areas of networking The book starts with a discussion on Cognitive Radio CR technologies as promising solutions for improving spectrum utilization and also highlights the advances in CR spectrum sensing techniques and resource management methods The second part of the book presents the latest developments and research in the areas of 5G technologies and Software Defined Networks SDN Solutions to the most pressing challenges facing the adoption of 5G technologies are also covered and the new paradigm known as Fog Computing is examined in the context of 5G networks The focus next shifts to efficient solutions for future heterogeneous networks It consists of a collection of chapters that discuss self healing solutions dealing with Network Virtualization QoS in heterogeneous networks and energy efficient techniques for Passive Optical Networks and Wireless Sensor Networks Finally the areas of IoT and Big Data are discussed including the latest developments and future perspectives of Big Data and the IoT paradigms

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applications of neural networks It then discusses fuzzy sets fuzzy rules applications of fuzzy systems and different types of fused neuro fuzzy systems before providing MATLAB illustrations of ANFIS classification and regression trees fuzzy c means clustering algorithms fuzzy ART map and Takagi Sugeno inference systems The authors also describe the history advantages and disadvantages of evolutionary computation and include solved MATLAB programs to illustrate the implementation of evolutionary computation in various problems After exploring the operators and parameters of genetic algorithms they cover the steps and MATLAB routines of genetic programming The final chapter introduces swarm intelligence and its applications particle swarm optimization and ant colony optimization Full of worked examples and end of chapter questions this comprehensive book explains how to use MATLAB to implement CI techniques for the solution of biological problems It will help readers with their work on evolution dynamics self organization natural and artificial morphogenesis emergent collective behaviors swarm intelligence evolutionary strategies genetic programming and the evolution of social behaviors

Automation in Textile Machinery L. Ashok Kumar,M Senthil kumar,2018-03-20 Automation is the use of various control systems for operating equipment such as machinery and processes In line this book deals with comprehensive analysis of the trends and technologies in automation and control systems used in textile engineering The control systems described in all chapters is to dissect the important components of an integrated control system in spinning weaving knitting chemical processing and garment industries and then to determine if and how the components are converging to provide manageable and reliable systems throughout the chain from fiber to the ultimate customer Key Features Describes the design features of machinery for operating various textile machineries in product manufacturing Covers the fundamentals of the instrumentation and control engineering used in textile machineries Illustrates sensors and basic elements for textile automation Highlights the need of robotics in textile engineering Reviews the overall idea and scope of research in designing textile machineries

Power Converters for Electric Vehicles L. Ashok Kumar,S. Albert Alexander,2020-12-10 Power Converters for Electric Vehicles gives an overview topology design and simulation of different types of converters used in electric vehicles EV It covers a wide range of topics ranging from the fundamentals of EV Hybrid EV and its stepwise approach simulation of the proposed converters for real time applications and corresponding experimental results performance improvement paradigms and overall analysis Drawing upon the need for novel converter topologies this book provides the complete solution for the power converters for EV applications along with simulation exercises and experimental results It explains the need for power electronics in the improvement of performance in EV This book Presents exclusive information on the power electronics of EV including traction drives Provides step by step procedure for converter design Discusses various topologies having different isolated and non isolated converters Describes control circuit design including renewable energy systems and electrical drives Includes practical case studies incorporated with simulation and experimental results Power Converters for Electric Vehicles will provide researchers and graduate students in Power

Electronics Electric Drives Vehicle Engineering a useful resource for stimulating their efforts in this important field of the search for renewable technologies **Non-linear Electromagnetic Systems** Volkmar Kose, Johannes Sievert, 1998

Operations Research. Optimization With Matlab. Multiobjective, Quadratic and Mixed Programming Perez C., 2017-08-16 The generalization of optimization theory and techniques to other formulations comprises a large area of applied mathematics Optimization includes finding best available values of some objective function given a defined domain or input including a variety of different types of objective functions and different types of domains Adding more than one objective to an optimization problem adds complexity For example to optimize a structural design one would desire a design that is both light and rigid When two objectives conflict a trade off must be created There may be one lightest design one stiffest design and an infinite number of designs that are some compromise of weight and rigidity The set of trade off designs that cannot be improved upon according to one criterion without hurting another criterion is known as the Pareto set The curve created plotting weight against stiffness of the best designs is known as the Pareto frontier A design is judged to be Pareto optimal equivalently Pareto efficient or in the Pareto set if it is not dominated by any other design If it is worse than another design in some respects and no better in any respect then it is dominated and is not Pareto optimal The choice among Pareto optimal solutions to determine the favorite solution is delegated to the decision maker In other words defining the problem as multi objective optimization signals that some information is missing desirable objectives are given but combinations of them are not rated relative to each other In some cases the missing information can be derived by interactive sessions with the decision maker Multi objective optimization problems have been generalized further into vector optimization problems where the partial ordering is no longer given by the Pareto ordering Optimization problems are often multi modal that is they possess multiple good solutions They could all be globally good or there could be a mix of globally good and locally good solutions Obtaining all or at least some of the multiple solutions is the goal of a multi modal optimizer Classical optimization techniques due to their iterative approach do not perform satisfactorily when they are used to obtain multiple solutions since it is not guaranteed that different solutions will be obtained even with different starting points in multiple runs of the algorithm Evolutionary algorithms however are a very popular approach to obtain multiple solutions in a multi modal optimization task This book develops the following topics Multiobjective Optimization Algorithms Using fminimax with a Simulink Model Signal Processing Using fgoalattain Generate and Plot a Pareto Front Linear Programming Algorithms Maximize Long Term Investments Using Linear Programming Mixed Integer Linear Programming Algorithms Tuning Integer Linear Programming Mixed Integer Linear Programming Basics Optimal Dispatch of Power Generators Mixed Integer Quadratic Programming Portfolio Optimization Quadratic Programming Algorithms Quadratic Minimization with Bound Constraints Quadratic Minimization with Dense Structured Hessian Large Sparse Quadratic Program with Interior Point Algorithm Least Squares Model Fitting Algorithms lsqnonlin with a Simulink Model Nonlinear Least Squares With and

Without Jacobian Linear Least Squares with Bound Constraints Optimization App with the lsqin Solver Maximize Long Term Investments Using Linear Programming Jacobian Multiply Function with Linear Least Squares Nonlinear Curve Fitting with lsqcurvefit Fit a Model to Complex Valued Data Systems of Equations Nonlinear Equations with Analytic Jacobian Nonlinear Equations with Jacobian Nonlinear Equations with Jacobian Sparsity Pattern Nonlinear Systems with Constraints Parallel Computing for Optimization *Solving Optimization Problems with MATLAB®* Dingyü Xue,2020-04-06 This book focuses on solving optimization problems with MATLAB Descriptions and solutions of nonlinear equations of any form are studied first Focuses are made on the solutions of various types of optimization problems including unconstrained and constrained optimizations mixed integer multiobjective and dynamic programming problems Comparative studies and conclusions on intelligent global solvers are also provided *High-Performance Simulation-Based Optimization* Thomas Bartz-Beielstein,Bogdan Filipič,Peter Korošec,El-Ghazali Talbi,2019-06-01 This book presents the state of the art in designing high performance algorithms that combine simulation and optimization in order to solve complex optimization problems in science and industry problems that involve time consuming simulations and expensive multi objective function evaluations As traditional optimization approaches are not applicable per se combinations of computational intelligence machine learning and high performance computing methods are popular solutions But finding a suitable method is a challenging task because numerous approaches have been proposed in this highly dynamic field of research That s where this book comes in It covers both theory and practice drawing on the real world insights gained by the contributing authors all of whom are leading researchers Given its scope it offers a comprehensive reference guide for researchers practitioners and advanced level students interested in using computational intelligence and machine learning to solve expensive optimization problems Computational Intelligence Nazmul Siddique,Hojjat Adeli,2013-05-06 Computational Intelligence Synergies of Fuzzy Logic Neural Networks and Evolutionary Computing presents an introduction to some of the cutting edge technological paradigms under the umbrella of computational intelligence Computational intelligence schemes are investigated with the development of a suitable framework for fuzzy logic neural networks and evolutionary computing neuro fuzzy systems evolutionary fuzzy systems and evolutionary neural systems Applications to linear and non linear systems are discussed with examples Key features Covers all the aspects of fuzzy neural and evolutionary approaches with worked out examples MATLAB exercises and applications in each chapter Presents the synergies of technologies of computational intelligence such as evolutionary fuzzy neural fuzzy and evolutionary neural systems Considers real world problems in the domain of systems modelling control and optimization Contains a foreword written by Lotfi Zadeh Computational Intelligence Synergies of Fuzzy Logic Neural Networks and Evolutionary Computing is an ideal text for final year undergraduate postgraduate and research students in electrical control computer industrial and manufacturing engineering **Optimization in Practice with MATLAB** Achille Messac,2015-03-19 This textbook is designed for students and industry practitioners for a first course

in optimization integrating MATLAB software *Computational Intelligence for Optimization* Nirwan Ansari, Edwin Hou, 2012-12-06 The field of optimization is interdisciplinary in nature and has been making a significant impact on many disciplines As a result it is an indispensable tool for many practitioners in various fields Conventional optimization techniques have been well established and widely published in many excellent textbooks However there are new techniques such as neural networks simulated annealing stochastic machines mean field theory and genetic algorithms which have been proven to be effective in solving global optimization problems This book is intended to provide a technical description on the state of the art development in advanced optimization techniques specifically heuristic search neural networks simulated annealing stochastic machines mean field theory and genetic algorithms with emphasis on mathematical theory implementation and practical applications The text is suitable for a first year graduate course in electrical and computer engineering computer science and operational research programs It may also be used as a reference for practicing engineers scientists operational researchers and other specialists This book is an outgrowth of a couple of special topic courses that we have been teaching for the past five years In addition it includes many results from our interdisciplinary research on the topic The aforementioned advanced optimization techniques have received increasing attention over the last decade but relatively few books have been produced **Computational Intelligence, Optimization and Inverse Problems with Applications in Engineering** Gustavo Mendes Platt, Xin-She Yang, Antônio José Silva Neto, 2018-09-25 This book focuses on metaheuristic methods and its applications to real world problems in Engineering The first part describes some key metaheuristic methods such as Bat Algorithms Particle Swarm Optimization Differential Evolution and Particle Collision Algorithms Improved versions of these methods and strategies for parameter tuning are also presented both of which are essential for the practical use of these important computational tools The second part then applies metaheuristics to problems mainly in Civil Mechanical Chemical Electrical and Nuclear Engineering Other methods such as the Flower Pollination Algorithm Symbiotic Organisms Search Cross Entropy Algorithm Artificial Bee Colonies Population Based Incremental Learning Cuckoo Search and Genetic Algorithms are also presented The book is rounded out by recently developed strategies or hybrid improved versions of existing methods such as the Lightning Optimization Algorithm Differential Evolution with Particle Collisions and Ant Colony Optimization with Dispersion state of the art approaches for the application of computational intelligence to engineering problems The wide variety of methods and applications as well as the original results to problems of practical engineering interest represent the primary differentiation and distinctive quality of this book Furthermore it gathers contributions by authors from four countries some of which are the original proponents of the methods presented and 18 research centers around the globe *Foundations of Computational Intelligence Volume 3* Ajith Abraham, Aboul-Ella Hassanien, Patrick Siarry, Andries Engelbrecht, 2009-05-01 Global optimization is a branch of applied mathematics and numerical analysis that deals with the task of finding the absolutely best set of admissible conditions to satisfy certain criteria

objective functions formulated in mathematical terms Global optimization includes nonlinear stochastic and combinatorial programming multiobjective programming control games geometry approximation algorithms for parallel architectures and so on Due to its wide usage and applications it has gained the attention of researchers and practitioners from a plethora of scientific domains Typical practical examples of global optimization applications include Traveling salesman problem and electrical circuit design minimize the path length safety engineering building and mechanical structures mathematical problems Kepler conjecture Protein structure prediction minimize the energy function etc Global Optimization algorithms may be categorized into several types Deterministic example branch and bound methods Stochastic optimization example simulated annealing Heuristics and meta heuristics example evolutionary algorithms etc Recently there has been a growing interest in combining global and local search strategies to solve more complicated optimization problems This edited volume comprises 17 chapters including several overview Chapters which provides an up to date and state of the art research covering the theory and algorithms of global optimization Besides research articles and expository papers on theory and algorithms of global optimization papers on numerical experiments and on real world applications were also encouraged The book is divided into 2 main parts

Recent Advances in Computational Optimization Stefka Fidanova, 2021-12-14 This book presents recent advances in computational optimization Our everyday life is unthinkable without optimization We try to minimize our effort and to maximize the achieved profit Many real world and industrial problems arising in engineering economics medicine and other domains can be formulated as optimization tasks The book is a comprehensive collection of extended contributions from the Workshops on Computational Optimization 2020 The book includes important real problems like modeling of physical processes workforce planning parameter settings for controlling different processes transportation problems wireless sensor networks machine scheduling air pollution modeling solving multiple integrals and systems of differential equations which describe real processes solving engineering problems It shows how to develop algorithms for them based on new intelligent methods like evolutionary computations ant colony optimization constrain programming and others This research demonstrates how some real world problems arising in engineering economics and other domains can be formulated as optimization problems

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