

József Farkas
Károly Jármai

Optimum Design of Steel Structures



 Springer

Optimum Design Of Steel Structures

Zong Woo Geem

Optimum Design Of Steel Structures:

Optimum Design of Steel Structures József Farkas, Károly Jármai, 2013-03-29 This book helps designers and manufacturers to select and develop the most suitable and competitive steel structures which are safe fit for production and economic. An optimum design system is used to find the best characteristics of structural models which guarantee the fulfilment of design and fabrication requirements and minimize the cost function. Realistic numerical models are used as main components of industrial steel structures. Chapter 1 contains some experiences with the optimum design of steel structures. Chapter 2 treats some newer mathematical optimization methods. Chapter 3 gives formulae for fabrication times and costs. Chapters 4 deals with beams and columns. Summarizes the Eurocode rules for design. Chapter 5 deals with the design of tubular trusses. Chapter 6 gives the design of frame structures and fire resistant design rules for a frame. In Chapters 7 some minimum cost design problems of stiffened and cellular plates and shells are worked out for cases of different stiffenings and loads. Chapter 8 gives a cost comparison of cylindrical and conical shells. The book contains a large collection of literatures and a subject list and a name index.

High Performance and Optimum Design of Structures and Materials V S.

Hernandez, G. Schleyer, 2022-09-13 The use of novel materials and new structural concepts nowadays is not restricted to highly technical areas like aerospace aeronautical applications or the automotive industry but affects all engineering fields including those such as civil engineering and architecture. The included contributions highlight the latest developments in design and manufacturing. Most high performance structures require the development of a generation of new materials which can more easily resist a range of external stimuli or react in a non conventional manner. Particular emphasis is placed on intelligent structures and materials as well as the application of computational methods for their modelling, control and management. The book also addresses the topic of design optimisation. Contributions cover numerical methods, different optimisation techniques and new software. Optimisation problems include those related to the size, shape and topology of structures and materials. Optimisation techniques have much to offer to those involved in the design of new industrial products as the appearance of powerful commercial computer codes has created a fertile field for the incorporation of optimisation in the design process of all engineering disciplines. The performance of structures under shock and impact loads is another area covered. The increasing need to protect civilian infrastructure and industrial facilities against unintentional loads arising from accidental impact and explosion events as well as terrorist attacks is reflected in the sustained interest worldwide. While advances have been made in recent decades many challenges remain such as developing more effective and efficient blast and impact mitigation approaches or assessing the uncertainties associated with large and small scale testing and validation of numerical and analytical models. The overall aim is to move towards a better understanding of the critical issues relating to the testing behaviour, modelling and analyses of protective structures against blast and impact loading. The studies contained in this volume were presented at the International Conference on High Performance and Optimum

Structures and Materials Encompassing Shock and Impact Loading and address issues involving advanced types of structures particularly those based on new concepts and shock and impact resistance **High Performance and Optimum Design of Structures and Materials** W. P. De Wilde,S. Hernández,C. A. Brebbia,2014-06-09 The use of novel materials and new structural concepts nowadays is not restricted to highly technical areas like aerospace aeronautical applications or the automotive industry but affects all engineering fields including those such as civil engineering and architecture Addressing issues involving advanced types of structures particularly those based on new concepts or new materials and their system design contributions highlight the latest developments in design optimisation manufacturing and experimentation Also included are contributions on new software numerical methods and different optimisation techniques Optimisation problems of interest involve those related to size shape and topology of structures and materials Most high performance structures require the development of a generation of new materials which can more easily resist a range of external stimuli or react in a non conventional manner Particular emphasis is placed on intelligent structures and materials as well as the application of computational methods for their modelling control and management Optimisation techniques have much to offer to those involved in the design of new industrial products The formulation of optimum design has evolved from the time it was purely an academic topic able now to satisfy the requirements of real life prototypes The development of new algorithms and the appearance of powerful commercial computer codes with easy to use graphical interfaces have created a fertile field for the incorporation of optimisation in the design process in all engineering disciplines This proceedings volume is the first from a new edition of the High Performance Design of Structures and Materials and the Optimum Design of Structures conferences which follows the success of a number of meetings that originated in 1989 Topics covered include Composite materials Material characterisation Experiments and numerical analysis Steel structures High performance concretes Natural fibre composites Transformable structures Lightweight structures Timber structures Environmentally friendly and sustainable structures Emerging structural applications Optimisation in civil engineering Evolutionary methods in optimisation Shape and topology optimisation Aerospace structures Structural optimisation Biomechanics application Material optimisation Life cost optimisation Intelligence structures and smart materials **High Performance and Optimum Design of Structures and Materials IV** S. Hernández,W.P. De Wilde,M. Sejnoha,2020-11-18 Most high performance structures require the development of a generation of new materials which can more easily resist a range of external stimuli or react in a non conventional manner Formed of research works presented at the 10th International Conference on High Performance and Optimum Design of Structures and Materials the included papers cover issues involving advanced types of structures particularly those based on new concepts or new materials and their system design Contributions highlight the latest developments in design optimisation manufacturing and experimentation There is also a focus on the search for higher performance sustainable materials Particular emphasis is placed on intelligent structures and materials as well as the

application of computational methods for their modelling control and management Optimisation problems are also covered including those related to the size shape and topology of structures and materials Optimisation techniques have much to offer to those involved in the design of new industrial products The development of new algorithms and the appearance of powerful commercial computer codes with easy to use graphical interfaces has created a fertile field for the incorporation of optimisation in the design process in all engineering disciplines

Optimum Design of Steel Structures Using Evolutionary Algorithms Zolisa Dolwana,2019

Analysis and Optimum Design of Metal Structures J Farkas,K.

Jármai,2020-12-18 Detailing a number of structural analysis problems such as residual welding stresses and distortions and behaviour of thin walled rods loaded in bending this text also explores mathematical function minimization methods expert systems and optimum design of welded box beams

Music-Inspired Harmony Search Algorithm Zong Woo

Geem,2009-05-12 Calculus has been used in solving many scientific and engineering problems For optimization problems however the differential calculus technique sometimes has a drawback when the objective function is step wise discontinuous or multi modal or when decision variables are discrete rather than continuous Thus researchers have recently turned their interests into metaheuristic algorithms that have been inspired by natural phenomena such as evolution animal behavior or metallic annealing This book especially focuses on a music inspired metaheuristic algorithm harmony search Interestingly there exists an analogy between music and optimization each musical instrument corresponds to each decision variable musical note corresponds to variable value and harmony corresponds to solution vector Just like musicians in Jazz improvisation play notes randomly or based on experiences in order to find fantastic harmony variables in the harmony search algorithm have random values or previously memorized good values in order to find optimal solution

Meta-heuristic Algorithms for Optimal Design of Real-Size Structures Ali Kaveh,Majid Ilchi Ghazaan,2018-04-10

The contributions in this book discuss large scale problems like the optimal design of domes antennas transmission line towers barrel vaults and steel frames with different types of limitations such as strength buckling displacement and natural frequencies The authors use a set of definite algorithms for the optimization of all types of structures They also add a new enhanced version of VPS and information about configuration processes to all chapters Domes are of special interest to engineers as they enclose a maximum amount of space with a minimum surface and have proven to be very economical in terms of consumption of constructional materials Antennas and transmission line towers are the one of the most popular structure since these steel lattice towers are inexpensive strong light and wind resistant Architects and engineers choose barrel vaults as viable and often highly suitable forms for covering not only low cost industrial buildings warehouses large span hangars indoor sports stadiums but also large cultural and leisure centers Steel buildings are preferred in residential as well as commercial buildings due to their high strength and ductility particularly in regions which are prone to earthquakes

Computer Aided Optimum Design of Structures VIII Santiago Hernández,C. A. Brebbia,M. E. M. El-Sayed,2003

Demonstrating the high level of maturity reached in design optimisation methodologies this book contains most of the papers presented at the 8th International Conference on Computer Aided Optimum Design of Structure State of the art advances in research together with a broad variety of practical applications in engineering practice are covered ***Advances in Metaheuristic Algorithms for Optimal Design of Structures*** A. Kaveh,2016-11-09 This book presents efficient metaheuristic algorithms for optimal design of structures Many of these algorithms are developed by the author and his colleagues consisting of Democratic Particle Swarm Optimization Charged System Search Magnetic Charged System Search Field of Forces Optimization Dolphin Echolocation Optimization Colliding Bodies Optimization Ray Optimization These are presented together with algorithms which were developed by other authors and have been successfully applied to various optimization problems These consist of Particle Swarm Optimization Big Bang Big Crunch Algorithm Cuckoo Search Optimization Imperialist Competitive Algorithm and Chaos Embedded Metaheuristic Algorithms Finally a multi objective optimization method is presented to solve large scale structural problems based on the Charged System Search algorithm The concepts and algorithms presented in this book are not only applicable to optimization of skeletal structures and finite element models but can equally be utilized for optimal design of other systems such as hydraulic and electrical networks In the second edition seven new chapters are added consisting of the new developments in the field of optimization These chapters consist of the Enhanced Colliding Bodies Optimization Global Sensitivity Analysis Tug of War Optimization Water Evaporation Optimization Vibrating Particle System Optimization and Cyclical Parthenogenesis Optimization algorithms A chapter is also devoted to optimal design of large scale structures ***Optimum Design of Metal Structures*** József Farkas,1984

International Symposium on Optimum Structural Design, October 19-22, 1981, Tucson, Arizona ,1981

Optimal Design of Seismic-resistant Planar Steel Frames ,1982 ***Computer Aided Optimum Design of Structures VII*** Santiago Hernández,C. A. Brebbia,2001 Demonstrating the high level of maturity reached in design optimisation methodologies this book contains most of the papers presented at the seventh international conference on Computer Aided Optimum Design of Structures Optimum Design of Plane Tall Steel Structures for Simultaneous Multicomponent Static, Dynamic, and Seismic Inputs Dhiraphorn Srifuengfung,1978 ***High Performance and Optimum Design Structure and Materials III*** Willy Patrick Wilde,S. Kravanja,Santiago Hernández,2018-12-03 Papers presented at the 2018 International Conference on High Performance and Optimum Design of Structures and Materials are contained in this volume These papers address issues involving advanced types of structures particularly those based on new concepts or new materials and their system design The use of novel materials and new structural concepts nowadays is not restricted to highly technical areas like aerospace aeronautical applications or the automotive industry but affects all engineering fields including those such as civil engineering and architecture Most high performance structures require the development of a generation of new materials which can more easily resist a range of external stimuli or react in a non conventional manner Particular emphasis

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Large Engineering Systems ,1976 **Computational Steel Structures Technology** M. Iványi,J. P. Muzeau,B. H. V. Topping,2000 Contains a selection of papers that were presented at The Fifth International Conference on Computational Structures Technology and The Second International Conference on Engineering Computational Technology which were held in Leuven Belgium from 6 8 September 2000 ODSEWS-2D Optimum Design of Static, Earthquake, and Wind Steel Structures Franklin Y. Cheng,Dhiraphorn Srifuengfung,L. H. Sheng,National Science Foundation (U.S.). Division of Problem-focused Research Applications,University of Missouri--Rolla. Department of Civil Engineering,1981 **Optimum Design of Earthquake-resistant Shear Buildings** D. Ray,Karl S. Pister,Anil K. Chopra,1974

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