Structural Analysis Of Historic Buildings Restoration Preservation And Adaptive Reuse Applications For Architects And Engineers

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Case Studies of Rehabilitation, Repair, Retrofitting, and Strengthening of Structures - Mourad M. Bakhoum 2010

Structural Studies, Repairs and Maintenance of Heritage Architecture XII - C. A. Brebbia 2011

Architectural heritage is now recognised to be of great importance to the historical identity of a region, town or nation. In order to take care of that heritage, we need to look beyond borders and share experiences and knowledge regarding heritage preservation. This book contains papers covering the latest advances in this field, presented at the twelfth and latest in a series of now-biennial conferences that began in 1989.The series is recognised as the most important conference on the topic. It covers such topics as Heritage architecture and historical aspects, Regional architecture, Preservation of archaeological sites, Maritime heritage, Heritage masonry buildings, Adobe restorations, Wooden structures, Structural issues and restoration, Seismic vulnerability and vibrations, Assessment, retrofitting and reuse of heritage buildings, Surveying and monitoring, Material characterisation and problems, Simulation and modelling, New techniques and materials, Non-destructive techniques, Experimental validation and verification, Performance and maintenance, Environmental damage. Social and economic aspects, and Guidelines, codes and regulations.

Building Evaluation for Adaptive Reuse and Preservation - J. Stanley Rabun 2009-01-09

"This book is designed for architects and engineers who need to evaluate existing buildings for a new use or for continuing a current use. It details each step of the evaluation process using an easy-to-follow and easy-to-implement approach that greatly reduces the possibility of unexpected costs and setbacks. Moreover, the book covers every part of the building itself, from interior and exterior structures to systems and materials." "Illustrations throughout the book will help you visualize and perform key procedures. In addition, the authors examine building evaluation issues for structures of different scales, such as medium and small commercial structures and residential buildings." "Most important, the authors help you assess the financial viability of a proposed adaptive reuse or preservation project, helping you and potential investors decide whether the proposed project offers a desired return on investment."--Jacket.

Reliability-Based Analysis and Design of Structures and Infrastructure - Ehsan Noroozinejad Farsangi 2021-09-27

Increasing demand on improving the resiliency of modern structures and infrastructure requires ever more critical and complex designs. Therefore, the need for accurate and efficient approaches to assess uncertainties in loads, geometry, material properties, manufacturing processes, and operational environments has increased significantly. Reliability-based techniques help develop more accurate initial guidance for robust design and help to identify the sources of significant uncertainty in structural systems. Reliability-Based Analysis and Design of Structures and Infrastructure presents an overview of the methods of classical reliability analysis and design most associated with structural reliability. It also introduces more modern methods and advancements, and emphasizes the most useful methods and techniques used in reliability and risk studies, while elaborating their practical applications and limitations rather than detailed derivations. Features: Provides a practical and comprehensive overview of reliability and risk analysis and design techniques. Introduces resilient and smart structures/infrastructure that will lead to more reliable and sustainable societies. Considers loss elimination, risk management and life-cycle asset management as related to infrastructure projects. Introduces probability theory, statistical methods, and reliability analysis methods. Reliability-Based Analysis and Design of Structures and Infrastructure is suitable for researchers and practicing engineers, as well as upper-level students taking related courses in structural reliability analysis and design.

Structural Analysis of Historical Constructions - 2 Volume Set - Claudio Modena 2004-11-15

Structural Analysis of Historical Constructions contains about 160 papers that were presented at the IV International Seminar on Structural Analysis

of Historical Constructions that was held from 10 to 13 November, 2004 in Padova Italy. Following publications of previous seminars that were organized in Barcelona, Spain (1995 and 1998) and Guimarães, Portugal (2001), state-of-the-art information is presented in these two volumes on the preservation, protection, and restoration of historical constructions, both comprising monumental structures and complete city centers. These two proceedings volumes are devoted to the possibilities of numerical and experimental techniques in the maintenance of historical structures. In this respect, the papers, originating from over 30 countries, are subdivided in the following areas: Historical aspects and general methodology, Materials and laboratory testing, Non-destructive testing and inspection techniques, Dynamic behavior and structural monitoring, Analytical and numerical approaches, Consolidation and strengthening techniques, Historical timber and metal structures, Seismic analysis and vulnerability assessment, Seismic strengthening and innovative systems, Case studies. Structural Analysis of Historical Constructions is a valuable source of information for scientists and practitioners working on structure-related issues of historical constructions

The Preparation and Use of Historic Structure Reports - Deborah Slaton 2005

Explains the purpose of historic structure reports, describes their value to the preservation of significant historic properties, outlines how reports are commissioned and prepared, and recommends an organizational format for such reports.

Historic Construction and Conservation - Pere Roca 2019-07-03

Conservation in the built environment raises fundamental questions which have been debated for centuries - what is worth preserving, how is it possible, why is it important? This book takes a modern approach to the meaning of a heritage structure and its conservation. The historical evolution of conservation is briefly addressed, considering prominent individuals and cases; along with the history of construction, focusing on materials and related structural elements, with insight on the sizing rules adopted by masons. This explains structural decisions made during the construction process and allows comparison of scientific theories from the 18th century to modern understanding of limit analysis. Damage and collapse mechanisms for masonry construction, as the most widespread structural form for historical buildings, is described. Excess permanent loading and settlement is differentiated from environmental and anthropogenic actions such as earthquake or incorrect intervention. The team of authors brings together unique expertise, with high level research and leading practice with archetypical cases from around the world. The book addresses the history of conservation by exploring materials and structures and the history of construction and damage, so it is of value to students and professionals in civil engineering and architecture, as well as archaeologists and art historians.

Conservation of Historic Buildings - Bernard Feilden 2007-06-07

Since its publication in 1982 Sir Bernard Feilden's Conservation of Historic Buildings has become the standard text for architects and others involved in the conservation of historic structures. Leading practitioners around the world have praised the book as being the most significant single volume on the subject to be published. This third edition revises and updates a classic book, including completely new sections on conservation of Modern Movement buildings and non-destructive investigation. The result of the lifetime's experience of one of the world's leading architectural conservators, the book comprehensively surveys the fundamental principles of conservation in their application to historic buildings, and provides the basic information needed by architects, engineers and surveyors for the solution of problems of architectural conservation in almost every climatic region of the world. This edition is organized into three complementary parts: in the first the structure of buildings is dealt with in detail; the second focuses attention on the causes of decay and the materials they affect; and the third considers the practical role of the architect involved in conservation and rehabilitation. As well as being essential reading for architects and others concerned with conservation, many lay people with various kinds of responsibility for historic buildings will find this clearly written, jargon-free work a fruitful source of guidance and information.

The Secretary of the Interior's Standards for the Treatment of Historic Properties - Kay D. Weeks 1995

Provides guidance to historic building owners and building managers, preservation consultants, architects, contractors, and project reviewers prior to treatment of historic buildings.

Heritage Problems, Causes and Solutions - Calogero Bellanca 2023-02-26

The book provides a series of reflections on Heritage Problems, Causes and Solutions, that have maturated during many years of study and research in Europe. It shows how this subject is inside the Critical Restoration. Its central nucleous of study is composed by specific in-depth three thematic sessions: Part I Methodological Approach to Conservation; physical approach. Part II Heritage Problems, causes and solutions. Part III Construction applied to Heritage. The authors have collected thematic essays on key issues during their didactic experiences in the course of Theory and Practice on Conservation in Faculty of Architecture, Sapienza University of Rome, and in courses of the Department of Construction and Technologics applied to Architecture, in ETSAM, UPM, and in other european universities.

Protection of Historical Constructions - Ioannis Vayas 2021-12-03

This book gathers the peer-reviewed papers presented at the 4th International Conference on Protection of Historical Constructions (PROHITECH), held in Athens, Greece, on October 25-27, 2021. The conference topics encompass structural and earthquake engineering, intervention strategies, materials and technologies, digital documentation, architecture and urban planning, cultural heritage, all of which represented

by a showcase of case studies covering different construction materials, as well as sustainability, energy efficiency, and adaptation to climate changes. As such the book represents an invaluable, up-to-the-minute tool, providing an essential overview of protection of historical constructions, and offers an important platform to researchers, engineers and architects.

Conservation of Historic Timber Structures - Knut Einar Larsen 2000

A comprehensive approach to the preservation of historic timber structures. The authors demonstrate that repair methods must be geared towards the specific cultural, architectural and environmental conditions of the area where the timber structure is located.

Structural Investigation of Historic Buildings - David C. Fischetti 2009-02-09

"Structural Investigation of Historic Buildings: A Case Study Guide to Preservation Technology for Buildings, Bridges, Towers, and Mills provides a practical guide for consulting structural engineers and others on dealing with issues unique to historic structures. Emphasizing structural evaluation and condition assessment based on sound preservation philosophy, but without burdening the reader with tedious calculations, the book discusses the role of the structural engineer in the evaluation and preservation process and discusses such topics as structural safety, analysis, and conservation."--Publisher's website.

Structural Analysis of Historical Constructions: Anamnesis, Diagnosis, Therapy, Controls - Koen Van Balen 2016-11-03

Structural Analysis of Historical Constructions. Anamnesis, diagnosis, therapy, controls contains the papers presented at the 10th International Conference on Structural Analysis of Historical Constructions (SAHC2016, Leuven, Belgium, 13-15 September 2016). The main theme of the book is “Anamnesis, Diagnosis, Therapy, Controls”, which emphasizes the importance of all steps of a restoration process in order to obtain a thorough understanding of the structural behaviour of built cultural heritage. The contributions cover every aspect of the structural analysis of historical constructions, such as material characterization, structural modelling, static and dynamic monitoring, non-destructive techniques for on-site investigation, seismic behaviour, rehabilitation, traditional and innovative repair techniques, and case studies. A special focus has been put on six specific themes: - Innovation and heritage - Preventive conservation - Computational strategies for heritage structures - Sustainable strengthening of masonry with composites - Values and sustainability, and - Subsoil interaction The knowledge, insights and ideas in Structural Analysis of Historical Constructions. Anamnesis, diagnosis, therapy, controls make this book of abstracts and the corresponding, digital full-colour conference proceedings containing the full papers must-have literature for researchers and practitioners involved in the structural analysis of historical constructions.

Building Codes for Existing and Historic Buildings - Melvyn Green 2011-10-07

Learn to apply the International Building Code and International Existing Building Code to historic buildings Written for architects, engineers, preservation, and code enforcement professionals, this is the only comprehensive book that examines how the International Building Code (IBC) and the International Existing Building Code (IEBC) can be applied to historic and existing buildings. For ease of use, the book is organized to parallel the structure of the IEBC itself, and the approach is cumulative, with the objective of promoting an understanding of the art of applying building regulations to the environment of existing buildings. Building Codes for Existing and Historic Buildings begins with a discussion of the history of building regulations in the United States and the events and conditions that created them. Next, it provides thorough coverage of: The rationale behind code provisions and historic preservation principles Major building code requirements: occupancy and use, types of construction, and heights and areas Building performance characteristics: fire and life safety, structural safety, health and hygiene, accident prevention, accessibility, and energy conservation Case study projects that reinforce the material covered Additionally, the book includes building analysis worksheets both blank and filled-in versions with examples that illustrate how to develop a code approach for an individual building. If you are a professional at any level who is working on creating a plan that meets the intent of the code for historic or existing buildings, Building Codes for Existing and Historic Buildings gives you everything that you need to succeed.

Structural Analysis of Historical Constructions – 2 Volume Set - Claudio Modena 2018-10-30

Structural Analysis of Historical Constructions contains about 160 papers that were presented at the IV International Seminar on Structural Analysis of Historical Constructions that was held from 10 to 13 November, 2004 in Padova Italy. Following publications of previous seminars that were organized in Barcelona, Spain (1995 and 1998) and Guimarães, Portugal (2001), state-of-the-art information is presented in these two volumes on the preservation, protection, and restoration of historical constructions, both comprising monumental structures and complete city centers. These two proceedings volumes are devoted to the possibilities of numerical and experimental techniques in the maintenance of historical structures. In this respect, the papers, originating from over 30 countries, are subdivided in the following areas: Historical aspects and general methodology, Materials and laboratory testing, Non-destructive testing and inspection techniques, Dynamic behavior and structural monitoring, Analytical and numerical approaches, Consolidation and strengthening techniques, Historical timber and metal structures, Seismic analysis and vulnerability assessment, Seismic strengthening and innovative systems, Case studies. Structural Analysis of Historical Constructions is a valuable source of information for scientists and practitioners working on structure-related issues of historical constructions

Conservation and Restoration of Built Heritage - Salvatore D'Agostino

2021-08-16

The word conservation, when used in the context of the preservation of built heritage, implies an intrinsically complex concept that evolved over time, since it has been influenced by the perception of history throughout time. This volume emphasises why an understanding of the cultural evolution of the conservation approach must be considered a prerequisite for architects and engineers if they are to cooperate in full harmony with historic-artistic culture for the preservation of global built heritage. In particular, the volume highlights how, during the second half of the last century, the preservation process also involved engineering – the science of making practical applications of knowledge – which, for a long time, made an uncritical use of techniques and materials and devised interventions on historical heritage that were heavily invasive. The volume also devotes special attention to the problems related to seismic risk, to which Italy, Greece and Portugal are particularly prone. Problems that emerge during the crisis and reconstruction phases are dealt with in detail, as is scheduled maintenance, as this latter approach always constitutes an improvement in the performance of the monument and is the most appropriate tool for the conservation of the built heritage. Finally, the volume collects examples of building restoration with case studies of many outstanding monuments. The work will appeal to professionals and academics in the broader fields of civil engineering (both geotechnical and structural engineering), architecture, art history, the history of architecture, restoration and cultural heritage management. This book will: Provide a critical reading of the history of conservation; Discuss materials and techniques of ancient architecture; Cover seismic vulnerability and preservation of the historic integrity of the monument; Advocate an approach based on programmed maintenance; Feature numerous case histories, including St Mark's Basilica in Venice and the complex restoration of the cathedral of Notre-Dame in Paris.

Building Adaptation - James Douglas 2006

Introduction; Feasibility; Principles of Building Conversion; Adaptive fuses; Lateral extensions; Vertical extensions; Structural alterations; Principles of refurbishment; Further aspects of refurbishment; Sustainable adaptation; Implementation; Appendices.

How to Write a Historic Structure Report - David Arbogast 2011-05-31

A one-of-a-kind, step-by-step guide to compiling an HSR—a document crucial to every professional working on a historic property. Any architect, engineer, or preservation professional renovating a historic property must be familiar with the historic structure report (HSR)—a document that evaluates all aspects of a property to minimize damage during restoration. The only book of its kind, this practical guide walks readers through the process of compiling an HSR. From gathering historical and archival data about the property to analyzing its structural, mechanical, and electrical components to assessing the state of its interior finish, including wood, masonry, and metals, this book covers all the nuts and bolts of an expertly written, informative HSR. Explaining what information should be included in each section and how investigators can work together effectively as a team to produce a comprehensive, coherent report, this handbook is one no professional should be without.

Structures Under Shock and Impact XIII - G. Schleyer 2014-06-03

SUSI XIII contains the proceedings of the 13th International Conference in the successful series of Structures Under Shock and Impact. Since the first meeting in Cambridge, Massachusetts (1989) the conference has brought together the research works of scientists and engineers from a wide range of academic disciplines and industrial backgrounds that have an interest in the structural impact response of structures and materials. The shock and impact behaviour of structures is a challenging area, not only because of the obvious time-dependent aspects, but also due to the difficulties in specifying the external dynamic loadings, boundary conditions and connection characteristics for structural design and hazard assessment, and in obtaining the dynamic properties of materials. Thus, it is important to recognise and utilise fully the contributions and understand the emerging theoretical, numerical and experimental studies on structures, as well as investigations into the material properties under dynamic loading conditions. Any increased knowledge will enhance our understanding of these problems and thorough forensic studies on the structural damage after accidents will lead to improved design requirements. The range of topics in this very active field is ever expanding. The following list of topics gives an idea of the wide number of applications covered: Impact and blast loading; Energy absorbing issues; Interaction between computational; and experimental results; Aeronautical and aerospace applications; Response of reinforce concrete under impact; Response of building facades to blast; Seismic behaviour; Structural crashworthiness; Industrial accidents and explosions; Hazard mitigation and assessment; Active protection and security; Tunnel and underground; structures protection; Dynamic analysis of composite structures; Design against failure; Damage limitation.

Preventive Conservation for Historic House Museums - Jane Merritt 2010

Preventive Conservation for Historic House Museums describes the care routines that a historic house should practice to protect the site and its collections from damage, wear, deterioration, and catastrophic loss.

Digital Transformation of the Design, Construction and Management Processes of the Built Environment - Bruno Daniotti 2019-01-01

This open access book focuses on the development of methods, interoperable and integrated ICT tools, and survey techniques for optimal management of the building process. The construction sector is facing an increasing demand for major innovations in terms of digital dematerialization and technologies such as the Internet of Things, big data, advanced manufacturing, robotics, 3D printing, blockchain technologies and artificial intelligence. The demand for simplification and transparency in information management and for the rationalization and

optimization of very fragmented and splintered processes is a key driver for digitization. The book describes the contribution of the ABC Department of the Polytechnic University of Milan (Politecnico di Milano) to R&D activities regarding methods and ICT tools for the interoperable management of the different phases of the building process, including design, construction, and management. Informative case studies complement the theoretical discussion. The book will be of interest to all stakeholders in the building process - owners, designers, constructors, and faculty managers - as well as the research sector.

The Conservation and Structural Restoration of Architectural Heritage - Giorgio Croci 1998-01-14

Structural analysis of architectural heritage is a new and growing branch of engineering. Knowledge of the history of architecture, material characteristics, instruments and techniques for investigations, diagnosis and restoration are all vital aspects for the correct understanding of structural behaviour and the ability to make correct decisions for repair and strengthening techniques. Designed for use by all professionals involved or interested in the preservation of monuments, the purpose of this book is to contribute to the development of new approaches in the area. Many of the examples examined, including the Colosseum, the Tower of Pisa, the Pyramid of Chephren, the Tilla Kari Mosque in Samarkand, the temples of Angkor and Konarak, the Santa Maria Vieja Cathedral, the domes of St Peter, Hagia Sophia, the Pantheon, St Ignatio de Loyola and St Charles, are the result of projects and studies carried out during Giorgio Croci's distinguished career. The book features numerous black and white photographs and illustrations by the author.

Structural Analysis of Historic Buildings - J. Stanley Rabun 2000-02-21

Structural Analysis of Historic Buildings offers the most' complete, detailed, and authentic data available on the materials, calculation methods, and design techniques used by architects and engineers of the nineteenth and early twentieth centuries. It provides today's building professionals with information needed to analyze, modify, and certify historic buildings for modern use. Among the many important features of this book not available in any other single volume are: * More than 350 line drawings and diagrams taken directly from original sources such as the Carnegie Steele Company's Pocket Companion (1893) and Frank Kidder's The Architect's and Builder's Pocketbook (1902) * Hard-to-find data on period structural components, such as cast-iron columns and beams, wrought-iron columns and beams, and fireproof terra cotta floor arches * Methods for determining what kind of loads structural components were originally designed to bear and methods to determine if they are still capable of performing as intended * Extensive coverage of historical foundation systems and empirical design methods for load-bearing masonry buildings For any building professional involved in the rapidly growing field of restoring, preserving, and adapting historic buildings, Structural Analysis of Historic Buildings is an invaluable structural handbook.

Historic Building Façades - New York Landmarks Conservancy 1997-04-24

Comprehensive, in-depth coverage from leading experts in thefield A historic building is a fragile resource that requires the finestcare. Maintenance and rehabilitation of walls and facades call fora thorough understanding of the forces that cause deterioration,knowledge of the properties of building materials, up-to-dateinspection tools and methods, and a solid command of renovation andrepair techniques. In this complete reference manual, recognizedexperts provide state-of-the-art information and methodologies forthe inspection, maintenance, and restoration of historic buildingsof virtually every period, style, and material. Each chapter opens with a general discussion of the facade materialand the ways in which structural and decorative elements arevulnerable to an array of environmental forces. After a detailedinvestigation of tools and techniques for inspection, the textexplores planning issues for the restoration or replacement offacade components. Special features include: * Separate chapters on each major type of building material--stonemasonry, brick masonry, terra-cotta masonry, cast stone, mortar,concrete, cast iron, sheet metal, and wood * An entire chapter on caulks and sealants * 35 original line drawings and 43 black and white photos that helpvisualize technical information * Selected success stories from preservation projects across theUnited States For architects, building contractors, and owners of historicbuildings, Historic Building Facades clarifies procedures, helpsidentify sources of deterioration, and offers solutions to even themost difficult maintenance and rehabilitation problems. It is alsoan excellent reference for building preservationists, architecturalhistorians, and students of building design and preservation.

Reinforcement of Timber Elements in Existing Structures - Jorge Branco 2021-04-30

By presenting the work of the RILEM Technical Committee 245-RTE, the book provides an overview of the existing techniques for the reinforcement of timber elements, joints and structures. It consists of two parts: part I examines state-of-the-art information on reinforcement techniques, summarizes the current status of standardization, and covers STS, GiR, FRP and nanotechnology. In part II several applications of reinforcement are discussed: these include traditional structures, traditional timber frame walls, light-frame shear walls, roofs, floors, and carpentry joints. The book will benefit academics, practitioners, industry and standardization committees interested in the reinforcement of existing timber elements, joints and structures.

Historic Lighthouse Preservation Handbook - Candace Clifford 1997

Structural Renovation of Buildings: Methods, Details, & Design Examples - Alexander Newman 2001

Make any renovation job go smoother. Building renovation, conservation and reuse represents more than half of all construction work - and is projected to increase to 80% by 2004. Structural Renovation of Buildings,

by Alexander Newman, puts a single, convenient source of information about all aspects of structural renovation and strengthening of buildings at your fingertips. While its focus is largely on low and midrise buildings, you can apply the principles it clarifies to buildings of any size - steel-framed, masonry, or wood. Whether you're repairing deteriorated concrete...rehabilitating slabs on grade...strengthening lateral-load resisting systems...renovating a building facade...handling seismic upgrades or fire damage, you'll find this time-and-trouble-saving guide loaded with practical tips, methods, and design examples. It's also heavily illustrated with autoCAD generated details, supplier illustrations of materials, procedural techniques, and much, much more.

Historic Preservation Technology - Robert A. Young 2008-03-21

This introduction to historic preservation goes well beyond the Secretary of the Interior's Standards for Rehabilitation and shows how wood, stone, masonry, and metal were used in the past and how adaptive re-use can be employed to bring modern amenities to historic structures. The book covers all aspects of the exterior and interior building fabric, including windows, roofing, doors, porches, and electrical and mechanical systems for both residential and small-scale commercial buildings. Richly illustrated with photographs showing typical elements of historic buildings, decay mechanisms, and remediation techniques, the book also contains a variety of useful case studies and features a companion Website that offers dozens of additional images and resources.

Structural Analysis of Historic Construction: Preserving Safety and Significance, Two Volume Set - Dina D'Ayala 2008-06-02

The successful preservation of an historic building, complex or city depends on the continued use and daily care that come with it. The possibility of continued use depends on the adaptation of the building to modern standards and practice of living, requiring changes in constructional or structural features. Conservation engineering is the process of understanding, interpreting and managing the architectural heritage to safely deliver it to posterity, enhancing private or public utility vis a vis minimum loss of fabric and significance. These two objectives are sometimes conflicting. With increasing global interest in conservation engineering it is essential to open the debate on more inclusive definitions of significance and on more articulated concepts of safety by use of acceptable and reliable technologies, integrating further the activity of all the professions involved in conservation.

The Conservation and Structural Restoration of Architectural Heritage - G. Croci 2014-07

Knowledge of the architectural history; material characteristics; techniques for investigations, diagnosis and restoration are all vital aspects for the correct understanding of structural behaviour and making correct decisions for repair and strengthening techniques. This book contributes to the development of new approaches in these areas.

Recording Historic Buildings - Historic American Buildings Survey 1970

From Corbel Arches to Double Curvature Vaults - Gabriele Milani 2022-12-23

The book focuses on all typological aspects of arches and vaults within the heritage of design and construction, while bringing attention to new “green” materials, promoting a circular economy informed by limitations caused by global warming. The multidisciplinary approach involves several different competences in architecture, structural engineering, conservation and restoration, geomatics, BIM, building engineering, the technology and history of construction, graphical methods of assessment, and innovative design that utilizes non-polluting materials. After an overview of the technical and aesthetic advantages of masonry vaults, there is a review of the most up-to-date trends in historic preservation. Classic methods of static assessment and innovative building technologies are detailed. Surveying methods and data acquisition are discussed, particularly laser scanning technology and its applications in heritage masonry curved structures. Next comes the experimental static and dymanic behavior of masonry vaults, followed by a critical revision of Distinct Element innovative computerized Methods. An explanation as to how to pass from classic stability analysis to an adaptive Finite Element Method limit analysis procedure is offered. Reinterpretation of the past is then undertaken, with an eye towards emphasizing sustainability. Finally, the conclusion examines still existing gaps in knowledge and recommends avenues of future research.

Nondestructive Techniques for the Assessment and Preservation of Historic Structures - Luisa Maria da Silva Gonçalves 2017-10-02

New technologies play an increasingly important role in the analysis, monitoring, restoration, and preservation of historic structures. These technological systems continue to get more advanced and complex, for example: 3D digital construction and documentation programming, 3D imaging data (including laser scanning and photogrammetry), multispectral and thermographic imaging, geophysical data, etc. This book will present the latest nondestructive technologies used in the characterization, preservation, and structural health monitoring of historic buildings. It will include numerous case studies, as well as theoretical explanations about each of the methods and technologies used in each.

Structural Analysis of Historical Constructions - Rafael Aguilar 2018-08-18

This volume contains the proceedings of the 11th International Conference on Structural Analysis of Historical Constructions (SAHC) that was held in Cusco, Peru in 2018. It disseminates recent advances in the areas related to the structural analysis of historical and archaeological constructions. The challenges faced in this field show that accuracy and robustness of results rely heavily on an interdisciplinary approach, where different areas of expertise from managers, practitioners, and scientists work together. Bearing this in mind, SAHC 2018 stimulated discussion on the new knowledge developed in the different disciplines involved in analysis, conservation, retrofit, and management of existing constructions. This book

is organized according to the following topics: assessment and intervention of archaeological heritage, history of construction and building technology, advances in inspection and NDT, innovations in field and laboratory testing applied to historical construction and heritage, new technologies and techniques, risk and vulnerability assessments of heritage for multiple types of hazards, repair, strengthening, and retrofit of historical structures, numerical modeling and structural analysis, structural health monitoring, durability and sustainability, management and conservation strategies for heritage structures, and interdisciplinary projects and case studies. This volume holds particular interest for all the community interested in the challenging task of preserving existing constructions, enable great opportunities, and also uncover new challenges in the field of structural analysis of historical and archeological constructions.

Analysis, Conservation, and Restoration of Tangible and Intangible Cultural Heritage - Inglese, Carlo 2018-10-12

Communities have witnessed a fundamental shift in the ways they interact with heritage sites. Much of this change has been driven by the rapid democratization and widespread adoption of enabling technologies. As expediency is embraced in the collection and analysis of data, there may also be a certain amount of intimacy lost with both the tangible and intangible vestiges of the past. Analysis, Conservation, and Restoration of Tangible and Intangible Cultural Heritage is a collection of innovative research on the quantitative methods and digital workflows transforming cultural heritage. There is no contesting the value of advanced non-destructive diagnostic imaging techniques for the analysis of heritage structures and objects. Highlighting topics including 3D modeling, conservation, and digital surveying, this book is ideally designed for conservation and preservation specialists, archaeologists, anthropologists, historians, academicians, and students seeking current research on data-driven, evidence-based decision making to improve intervention outcomes.

Geotechnical Engineering for the Preservation of Monuments and Historic Sites III - Renato Lancellotta 2022-06-15

This book contains the invited lectures presented at the 3th International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites (IS NAPOLI 2022, Naples, Italy, 22-24 June 2022). It collects the opening address, the third Kerisel Lecture, four keynote lectures and eleven panel lectures, and provides a broad impression of 1. the current state of knowledge and 2. the techniques used worldwide for the preservation of built heritage. When confronted with structures relevant to local and global history, there is only one way to select the best possible conservation solution: the multidisciplinary approach. Therefore, the invited speakers have been selected with different pertinent skills, to represent this complexity from the points of view of geotechnical engineers, structural engineers, architects and conservation experts. The book will be useful to researchers, practitioners, administrations and all those working or interested in the preservation of built heritage.

Structural Restoration of Masonry Monuments - George G. Penelis 2020-01-31

Historic structures need to be restored in line with international guidance and charters developed by architects and archaeologists, but technical understanding of structural engineering and materials is crucial, particularly with respect to response to earthquake loading. This guide to structural assessment and restoration of masonry monuments and historical buildings outlines the techniques, materials and design procedures used. It begins with principles, theory and practice and then presents case studies. The assessment focusses on Building materials and construction techniques used in the past The mechanics of masonry The structural behaviour of masonry monuments and historical buildings In-situ investigation and laboratory tests for existing and restoration materials. The restoration elaborates on Techniques and materials available for structural restoration Structural analysis and design Deciding on the restoration scheme Emergency measures and protective measures.

Structural Analysis of Historical Constructions: Anamnesis, Diagnosis, Therapy, Controls - Koen Van Balen 2016-11-03

Structural Analysis of Historical Constructions. Anamnesis, diagnosis, therapy, controls contains the papers presented at the 10th International Conference on Structural Analysis of Historical Constructions (SAHC2016, Leuven, Belgium, 13-15 September 2016). The main theme of the book is “Anamnesis, Diagnosis, Therapy, Controls”, which emphasizes the importance of all steps of a restoration process in order to obtain a thorough understanding of the structural behaviour of built cultural heritage. The contributions cover every aspect of the structural analysis of historical constructions, such as material characterization, structural modelling, static and dynamic monitoring, non-destructive techniques for on-site investigation, seismic behaviour, rehabilitation, traditional and innovative repair techniques, and case studies. The knowledge, insights and ideas in Structural Analysis of Historical Constructions. Anamnesis, diagnosis, therapy, controls make this book of abstracts and the corresponding, digital full-colour conference proceedings containing the full papers must-have literature for researchers and practitioners involved in the structural analysis of historical constructions.

Modelling and Structural Analysis of Historical Masonry Systems Including Vaulted Structure - Yohei Endo 2015

The conservation of historic structures has been given special attention due to their cultural, social and economic importance. However they often show considerable structural vulnerability and have been seriously damaged by natural disasters including earthquakes. An excessive loss of architectural heritage has occurred because of earthquakes. A safety assessment and restoration practice on historical structures has been tackled extensively by professionals including architects and engineers. However, structural assessment of historical buildings is a complex task.

Complexity comes from insufficient understanding of the characteristic of historical materials, limited knowledge of the seismic response of historical structures and yet-unknown structural deterioration due to the past natural disasters. Today it is perceived that nonlinear FEM analysis permits detailed study of historical masonry structures. However, in some cases, its application poses difficulties. The difficulties derive from the definition of material properties, the definition of a complex geometry and the analysis procedures. The results depend on the material properties considerably. However, it is not easy to describe appropriately the behaviour of historical materials including masonry in the FEM analysis. The definition of a complex geometry is challenging although the discretisation of accurate geometry is crucial. As for the analysis procedure, one of the difficulties is observed in seismic assessment. FEM-based nonlinear dynamic analysis permits close observation of seismic response of a historical masonry structure but it requires excessive computational effort, for a large-scale structure in particular. On the other hand, pushover can be adopted more efficiently than nonlinear dynamic analysis but the obtained result can be less reliable. All these considerations indicate that the understanding of FEM approaches still needs to be deepened to adopt more accurately and at the same time efficiently for the analysis of historical structures. The present research discusses the applicability of existing nonlinear FEM approaches to the study of masonry historical structures. The FEM analysis is adopted to the analysis of real and complex structures including mixed steel and masonry vaulted systems belonging to the Hospital de Sant Pau in Barcelona and a large single-nave church damaged by the 2009 Abruzzo earthquake. As a final outcome of the research, the conclusions provided criteria and guidelines for the analysis of these types of structures under vertical loading and seismic forces. The achievement of the research will contribute to both engineers and researchers who are involved in the conservation of historical masonry structures especially by means of FEM analysis.