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International Handbook of Earthquake Engineering

Springer
Science & Business
Media

This book contains 9
invited keynote and 12
theme lectures
presented at the 14th
European Conference
on Earthquake
Engineering (14ECEE)
held in Ohrid, Republic
of Macedonia, from
August 30 to
September 3, 2010.
The conference was
organized by the
Macedonian
Association for

Earthquake
Engineering (MAEE),
under the auspices of
European Association
for Earthquake
Engineering (EAEE).
The book is organized
in twenty one state-of-
the-art papers written
by carefully selected
very eminent
researchers mainly
from Europe but also
from USA and Japan.
The contributions
provide a very
comprehensive
collection of topics on
earthquake
engineering, as well as
interdisciplinary
subjects such as
engineering
seismology and
seismic risk
assessment and
management.
Engineering

seismology, geotechnical earthquake engineering, seismic performance of buildings, earthquake resistant engineering structures, new techniques and technologies and managing risk in seismic regions are all among the different topics covered in this book. The book also includes the First Ambraseys Distinguished Award Lecture given by Prof. Theo P. Tassios in the honor of Prof. Nicholas N. Ambraseys. The aim is to present the current state of knowledge and engineering practice, addressing recent and ongoing developments while also projecting innovative ideas for future research and development. It is not

always possible to have so many selected manuscripts within the broad spectrum of earthquake engineering thus the book is unique in one sense and may serve as a good reference book for researchers in this field. Audience: This book will be of interest to civil engineers in the fields of geotechnical and structural earthquake engineering; scientists and researchers in the fields of seismology, geology and geophysics. Not only scientists, engineers and students, but also those interested in earthquake hazard assessment and mitigation will find in this book the most recent advances. Performance-based Plastic Design PHI Learning Pvt. Ltd.

Encompassing theory and field experience, this book covers all the main subject areas in earthquake risk reduction, ranging from geology, seismology, structural and soil dynamics to hazard and risk assessment, risk management and planning, engineering and the architectural design of new structures and equipment. Earthquake Risk Reduction outlines individual national weaknesses that contribute to earthquake risk to people and property; calculates the seismic response of soils and structures, using the structural continuum 'Subsoil - Substructure - Superstructure - Non-structure'; evaluates the effectiveness of given designs and

construction procedures for reducing casualties and financial losses; provides guidance on the key issue of choice of structural form; presents earthquake resistant designs methods for the four main structural materials - steel, concrete, reinforced masonry and timber - as well as for services equipment, plant and non-structural architectural components; contains a chapter devoted to problems involved in improving (retrofitting) the existing built environment. Compiled from the author's extensive professional experience in earthquake engineering, this key text provides an excellent treatment of the complex

multidisciplinary process of earthquake risk reduction. This book will prove an invaluable reference and guiding tool to practicing civil and structural engineers and architects, researchers and postgraduate students in seismology, local governments and risk management officials. *Seismic Architecture* John Wiley & Sons Talking about earthquake engineering, this second edition is intended for practising structural engineers, including those with little or no knowledge of the subject, and also for advanced engineering students. It discusses the provisions of seismic codes, particularly Eurocode 8. *Earthquake Resistant*

Design CRC Press Earthquake Resistant Design and Risk Reduction, 2nd edition is based upon global research and development work over the last 50 years or more, and follows the author's series of three books Earthquake Resistant Design, 1st and 2nd editions (1977 and 1987), and Earthquake Risk Reduction (2003). Many advances have been made since the 2003 edition of Earthquake Risk Reduction, and there is every sign that this rate of progress will continue apace in the years to come. Compiled from the author's wide design and research experience in earthquake engineering and engineering

seismology, this key text provides an excellent treatment of the complex multidisciplinary process of earthquake resistant design and risk reduction. New topics include the creation of low-damage structures and the spatial distribution of ground shaking near large fault ruptures. Sections on guidance for developing countries, response of buildings to differential settlement in liquefaction, performance-based and displacement-based design and the architectural aspects of earthquake resistant design are heavily revised. This book: Outlines individual national weaknesses that contribute to earthquake risk to people and property

Calculates the seismic response of soils and structures, using the structural continuum “Subsoil – Substructure – Superstructure – Non-structure” Evaluates the effectiveness of given design and construction procedures for reducing casualties and financial losses Provides guidance on the key issue of choice of structural form Presents earthquake resistant design methods for the main four structural materials – steel, concrete, reinforced masonry and timber – as well as for services equipment, plant and non-structural architectural components Contains a chapter devoted to problems involved in improving (retrofitting)

the existing built environment This book is an invaluable reference and guiding tool to practising civil and structural engineers and architects, researchers and postgraduate students in earthquake engineering and engineering seismology, local governments and risk management officials.

Earthquake Design Practice for Buildings
Springer

This full color manual is intended to explain the principles of seismic design for those without a technical background in engineering and seismology. The primary intended audience is that of architects, and includes practicing architects, architectural students

and faculty in architectural schools who teach structures and seismic design. For this reason the text and graphics are focused on those aspects of seismic design that are important for the architect to know.

Designing for Earthquakes World Scientific

This book covers all the four major areas of Earthquake Engineering such as Structural Dynamics, Seismology, Seismic Analysis, Aseismic Design, including design philosophy, capacity design and codal provisions. It also provides detailed information on liquefaction of soil and effects of soil properties on response spectra. Each chapter is well-designed and

well-balanced with lucid illustrations and diagrams. Numerous solved examples have been included for better comprehension of the concepts. Exercises with answers have been provided at the end of each chapter to develop problem-solving skills of the students. This comprehensive survey of the effects of earthquakes on dynamics of structures and their aseismic design is intended for B.E./B.Tech students of Civil Engineering and M.E./M.Tech. students of Structural Engineering. Salient Features : The concepts and theories of earthquake engineering are presented in a lucid manner, with ample discussions and numerous examples.

Solved examples in each chapter illustrate the fundamental concepts and provide pedagogical reinforcement to ensure student comprehension. Incorporates necessary codal provisions such as IS 1893:2002, IS 13920:1993 and IS 4326:1976 for Seismic Analysis and Aseismic Design. Seismic Analysis and Aseismic Design of a five-storey RC frame is specially emphasized. Highlights the various new techniques in the field of earthquake engineering.

Earthquake Resistant Design of Structures OUP India Design of Wind and Earthquake Resistant Reinforced Concrete Buildings explains wind and seismic design issues of RCC buildings

in brief and provides design examples based on recommendations of latest IS codes essential for industrial design. Intricate issues of RCC design are discussed which are supplemented by real-life examples. Guidelines are presented for evaluating the acceptability of wind-induced motions of tall buildings. Design methodologies for structures to deform well beyond their elastic limits, which is essential under seismic excitation, have been discussed in detail. Comparative discussion including typical design examples using recent British, Euro and American codes is also included. Features: Explains wind and earthquake resistant

design issues, balancing theoretical aspects and design implications, in detail Discusses issues for designing the wind and earthquake resistant RCC structures Provides comprehensive understanding, analysis, design and detailing of the structures Includes a detailed discussion on IS code related to wind and earthquake resistant design and its comparison with Euro, British and American codes Contains architectural drawings and structural drawings The book is aimed at researchers, professionals, graduate students in wind and earthquake engineering, design of RCC structures, modelling and analysis of structures,

civil/infrastructure engineering.

Earthquake Resistance of Buildings Springer Science & Business Media

This book provides senior undergraduate students, master students and structural engineers who do not have a background in the field with core knowledge of structural earthquake engineering that will be invaluable in their professional lives. The basics of seismotectonics, including the causes, magnitude, and intensity of earthquakes, are first explained. Then the book introduces basic elements of seismic hazard analysis and presents the concept of a seismic hazard map for use in seismic

design. Subsequent chapters cover key aspects of the response analysis of simple systems and building structures to earthquake ground motions, design spectrum, the adoption of seismic analysis procedures in seismic design codes, seismic design principles and seismic design of reinforced concrete structures. Helpful worked examples on seismic analysis of linear, nonlinear and base isolated buildings, earthquake-resistant design of frame and frame-shear wall systems are included, most of which can be solved using a hand calculator.

Seismic Design of Reinforced Concrete and Masonry Buildings
Thomas Telford
My involvement in the

use of natural rubber as a method for the protection of buildings against earthquake attack began in 1976. At that time, I was working on the development of energy-dissipating devices for the same purpose and had developed and tested a device that was eventually used in a stepping-bridge structure, this being a form of partial isolation. It became clear to me that in order to use these energy devices for the earthquake protection of buildings, it would be best to combine them with an isolation system which would give them the large displacements needed to develop sufficient hysteresis. At this appropriate point in time, I was approached

by Dr. C. J. Derham, then of the Malaysian Rubber Producers' Research Association (MRPRA), who asked if I was interested in looking at the possibility of conducting shaking table tests at the Earthquake Simulator Laboratory to see to what extent natural rubber bearings could be used to protect buildings from earthquakes. Very soon after this meeting, we were able to do such a test using a 20-ton model and hand-made isolators. The early tests were very promising. Accordingly, a further set of tests was done with a more realistic five storey model weighing 40 tons with bearings that were commercially made. In both of the test series,

the isolators were used both alone and with a number of different types of energy-dissipating devices to enhance damping.

Earthquake-Resistant Design with Rubber

McGraw Hill

Professional

This concise work provides a general introduction to the design of buildings which must be resistant to the effect of earthquakes. A major part of this design involves the building structure which has a primary role in preventing serious damage or structural collapse.

Much of the material presented in this book examines building structures. Due to the recent discovery of vertical components, it examines not only the resistance to lateral

forces but also analyses the disastrous influence of vertical components. The work is written for Practicing Civil, Structural, and Mechanical Engineers, Seismologists and Geoscientists. It serves as a knowledge source for graduate students and their instructors.

Earthquake-Resistant Structures Springer

While numerous books have been written on earthquakes, earthquake resistance design, and seismic analysis and design of structures, none have been tailored for advanced students and practitioners, and those who would like to have most of the important aspects of seismic analysis in one place. With this book, readers will gain proficiencies in the following:

fundamentals of seismology that all structural engineers must know; various forms of seismic inputs; different types of seismic analysis like, time and frequency domain analyses, spectral analysis of structures for random ground motion, response spectrum method of analysis; equivalent lateral load analysis as given in earthquake codes; inelastic response analysis and the concept of ductility; ground response analysis and seismic soil structure interaction; seismic reliability analysis of structures; and control of seismic response of structures. Provides comprehensive coverage, from seismology to seismic control Contains useful

empirical equations often required in the seismic analysis of structures Outlines explicit steps for seismic analysis of MDOF systems with multi support excitations Works through solved problems to illustrate different concepts Makes use of MATLAB, SAP2000 and ABAQUS in solving example problems of the book Provides numerous exercise problems to aid understanding of the subject As one of the first books to present such a comprehensive treatment of the topic, Seismic Analysis of Structures is ideal for postgraduates and researchers in Earthquake Engineering, Structural Dynamics, and Geotechnical

Earthquake Engineering. Developed for classroom use, the book can also be used for advanced undergraduate students planning for a career or further study in the subject area. The book will also better equip structural engineering consultants and practicing engineers in the use of standard software for seismic analysis of buildings, bridges, dams, and towers. Lecture materials for instructors available at www.wiley.com/go/datt

aseismic NEHRP Recommended Provisions (National Earthquake Hazards Reduction Program) for Seismic Regulations for New Buildings and Other Structures: Commentary McGraw-

Hill Companies

Throughout the past few years, there has been extensive research done on structural design in terms of optimization methods or problem formulation. But, much of this attention has been on the linear elastic structural behavior, under static loading condition. Such a focus has left researchers scratching their heads as it has led to vulnerable structural configurations. What researchers have left out of the equation is the element of seismic loading. It is essential for researchers to take this into account in order to develop earthquake resistant real-world structures.

Structural Seismic Design Optimization and Earthquake

Engineering: Formulations and Applications focuses on the research around earthquake engineering, in particular, the field of implementation of optimization algorithms in earthquake engineering problems. Topics discussed within this book include, but are not limited to, simulation issues for the accurate prediction of the seismic response of structures, design optimization procedures, soft computing applications, and other important advancements in seismic analysis and design where optimization algorithms can be implemented. Readers will discover that this book provides relevant theoretical frameworks in order to

enhance their learning on earthquake engineering as it deals with the latest research findings and their practical implementations, as well as new formulations and solutions.

Design of Wind and Earthquake Resistant Reinforced Concrete Buildings Springer

A state-of-the-art summary of recent developments in the behaviour, analysis and design of seismic resistant steel frames. Much more than a simple background volume, it gives the most recent results which can be used in the near future to improve the codified recommendations for steel structures in seismic zones. It contains new material which can

*Vibration of Buildings
to Wind and
Earthquake Loads*

Springer

This handbook contains up-to-date existing structures, computer applications, and information on planning, analysis, and design seismic design of wood structures. A new and very useful feature of this edition of earthquake-resistant building structures. Its intention is to provide engineers, architects, is the inclusion of a companion CD-ROM disc developers, and students of structural containing the complete digital version of the handbook itself and the following very engineering and architecture with authoritative, yet practical, design information. It

represents important publications: an attempt to bridge the persisting gap between 1. UBC-IBC (1997-2000) Structural advances in the theories and concepts of Comparisons and Cross References, ICBO, earthquake-resistant design and their 2000. implementation in seismic design practice. 2. NEHRP Guidelines for the Seismic The distinguished panel of contributors is Rehabilitation of Buildings, FEMA-273, Federal Emergency Management Agency, composed of 22 experts from industry and universities, recognized for their knowledge and 1997. extensive practical experience in their fields. 3. NEHRP Commentary on the

Guidelines for They have aimed to present clearly and the Seismic Rehabilitation of Buildings, FEMA-274, Federal Emergency concisely the basic principles and procedures pertinent to each subject and to illustrate with Management Agency, 1997. practical examples the application of these 4. NEHRP Recommended Provisions for principles and procedures in seismic design Seismic Regulations for New Buildings and practice. Where applicable, the provisions of Older Structures, Part 1 - Provisions, various seismic design standards such as mc FEMA-302, Federal Emergency 2000, UBC-97, FEMA-273/274 and ATC-40

Management Agency, 1997. Theory and Design of Seismic Resistant Steel Frames CRC Press Earthquake-resistant structures are the structures considered to withstand earthquakes. While no structure can be entirely resistant to damage from earthquakes, the goal of earthquake-resistant building is to create structures that fare better during seismic activity than their predictable counterparts. Earthquake-resistant structures are envisioned to resist the largest earthquake of a certain probability that is likely to occur at their location. This means the loss of life should be minimized by preventing collapse of the buildings for rare

earthquakes while the loss of functionality should be limited for more frequent ones. To be earthquake proof, buildings, structures and their foundations need to be built to be resistant to sideways loads. The lighter the building is, the less the loads. This is particularly so when the weight is higher up. They must be strong enough to take the loads. They must be tied in to any framing, and reinforced to take load in their weakest direction. They must not fall apart and must remain in place after the worst shock waves so as to retain strength for the aftershocks. Currently, there are several design philosophies in earthquake engineering, making use of experimental

results, computer simulations and observations from past earthquakes to offer the required performance for the seismic threat at the site of interest. These range from appropriately sizing the structure to be strong and ductile enough to survive the shaking with an acceptable damage, to equipping it with base isolation or using structural vibration control technologies to minimize any forces and deformations. This book highlights on seismic-resistance design of masonry and reinforced concrete structures to be constructed in addition to safety assessment, strengthening and rehabilitation of existing structures in contrast to earthquake

loads. This book focuses on earthquake-resistant structures, such as, buildings, bridges and liquid storage tanks. It covers topics in the field of earthquake engineering. The book provides the contemporary topics on recent progress in earthquake-resistant structures and a helpful tool for graduate students, researchers and practicing structural engineers.

Design of Earthquake-resistant Buildings
Springer

This book focuses on the seismic design of Structures, Piping Systems and Components (SSC). It explains the basic mechanisms of earthquakes, generation of design basis ground motion,

and fundamentals of structural dynamics; further, it delves into geotechnical aspects related to the earthquake design, analysis of multi degree-of-freedom systems, and seismic design of RC structures and steel structures. The book discusses the design of components and piping systems located at the ground level as well as at different floor levels of the structure. It also covers anchorage design of component and piping system, and provides an introduction to retrofitting, seismic response control including seismic base isolation, and testing of SSCs. The book is written in an easy-to-understand way, with review questions, case studies and detailed

examples on each topic. This educational approach makes the book useful in both classrooms and professional training courses for students, researchers, and professionals alike.

BASICS OF STRUCTURAL DYNAMICS AND ASEISMIC DESIGN CRC Press

The Proceedings of the NATO Advanced Study Institute on Analysis and Design of Bridges held at ~eşme, Izmir, Turkey from 28 June 1982 to 9 July 1982 are contained in the present volume. The Advanced Study Institute was attended by 37 lecturers and participants from 10 different countries. The Organizing Committee consisted of Professors P. Gtilkan, A. C. Scordelis, S. T. Wasti

and 9. Yl. Imaz. The guidelines set by NATO for the Advanced Study Institute require it to serve not only as an efficient forum for the dissemination of available advanced knowledge to a selected group of qualified people but also as a platform for the exploration of future research possibilities in the scientific or engineering areas concerned. The main topics covered by the present Advanced Study Institute were the mathematical modelling of bridges for better analysis and the scientific assessment of bridge behaviour for the introduction of improved design procedures. It has been our observation that as a result of the range

and depth of the lectures presented and the many informal discussions that took place, ideas became fissile, the stimulus never flagged and many gaps in the engineering knowledge of the participants were "bridged". Here we particularly wish to mention that valuable informal presentations of research work were made during the course of the Institute by Drs. Friedrich, Karaesmen, Lamas and Parker.

Earthquake Risk Reduction

Butterworth-Heinemann

This is arguably the most comprehensive book on the subject of architectural-structural design decisions that influence the seismic performance of buildings. It explores

the intersection between the architecture and the structural design through the lens of earthquake engineering. The main aim of this unique book, written by renowned engineer M.Llunji, is to explain in the simplest terms, the architecture and structure of earthquake-resistant buildings, using many practical examples and case studies to demonstrate the fact that structures and buildings react to earthquake forces mainly according to their form, configuration and material. The purpose of this book is to introduce a new perspective on seismic design, a more visual, conceptual and architectural one, to

both architects and engineers. In a word, it is to introduce architectural opportunities for earthquake resistant-buildings, treating seismic design as a central architectural issue. A non-mathematical and practical approach emphasizing graphical presentation of problems and solutions makes it equally accessible to architectural and engineering professionals. The book will be invaluable for practicing engineers, architects, students and researchers. .More than 500 illustrations/photographs and numerous case studies. Seismic Architecture covers: • Earthquake effects on structures • Seismic force resisting systems

- Advanced systems for seismic protection • Architectural/structural configuration and its influence on seismic response • Contemporary architecture in seismic regions • Seismic response of nonstructural elements • Seismic retrofit and rehabilitation of existing buildings • Seismic architecture.

Chile Earthquake of 2010 Springer Science & Business Media

This book is a state-of-the-art report on the ductility of steel structures, containing a comprehensive review of the technical literature available, and presenting the results of the authors' own extensive research activities in this area. Analytical and numerical methods are described, and a

wealth of practical information is provided. Ductility of Seismic-Resistant Steel Structures will be of great use to advanced students, researchers, designers and professionals in the field of civil, structural and earthquake engineering.

Basic Earthquake Engineering Amer

Society of Civil Engineers

This book aims to serve as an essential reference to facilitate civil engineers involved in the design of new conventional (ordinary) reinforced concrete (R/C) buildings regulated by the current European EC8 (EN 1998-1:2004) and EC2 (EN 1992-1-1:2004) codes of practice. The book provides unique step-by-step flowcharts

which take the reader through all the required operations, calculations, and verification checks prescribed by the EC8 provisions. These flowcharts are complemented by comprehensive discussions and practical explanatory comments on critical aspects of the EC8 code-regulated procedure for the earthquake resistant design of R/C buildings. Further, detailed analysis and design examples of typical multi-storey three-dimensional R/C buildings are included to illustrate the required steps for achieving designs of real-life structures which comply with the current EC8 provisions. These examples can be readily used as

verification tutorials to check the reliability of custom-made computer programs and of commercial Finite Element software developed/used for the design of earthquakeresistant R/C buildings complying with the EC8 (EN 1998-1:2004) code. This book will be of interest to

practitioners working in consulting and designing engineering companies and to advanced undergraduate and postgraduate level civil engineering students attending courses and curricula in the earthquake resistant design of structures and/or undertaking pertinent design projects.