Response Of High Rise Buildings Under Long Period

The book deals with the geotechnical analysis and design of foundation systems for high-rise buildings and other complex structures with a distinctive soil-structure interaction. The basics of the analysis of stability and serviceability, necessary soil investigations, important technical regulations and quality and safety assurance are explained and possibilities for optimised foundation systems are given. Additionally, special aspects of foundation systems such as geothermal activated foundation systems and the reuse of existing foundations are described and illustrated by examples from engineering practice.

tenant is looming in importance. The owner is having more influence on the building. As Gerald D. Hines has said, there are indications that the desire for more discretionary time will lead to more residential high-rises dose to or in the midst of downtown office buildings. Downtown living could become the desired alternative. Tall buildings will be approached increasingly from the standpoint of an urban ecology - that what happens to apart can influence the whole. Provid ing for public as well as private needs in a tall building project is just one example (facilities for schools, shops, religious, and other needs). More attention will be paid to maintaining streets as lively and interesting places. Will a new "world's tallest" be built? Will we go a mile high? The answer is probably "yes" to the first, "no" to the second. With the recent spate of super-tall buildings on the drawing boards, going to greater heights was in the back of many people's minds at the Chicago conference. But in the U nited States, at least, buildings of 70 to 80 stories would appear to provide needed space consistent with economy. The future, then, is described in depth by papers that go into specific areas.

The structural challenges of building 800 metres into the sky are substantial, and include several factors which do not affect low-rise construction. This book focusses on these areas specifically to provide the architectural and structural knowledge which must be taken into account in order to design tall buildings successfully. In presenting examples of steel, reinforced concrete, and composite structural systems for such buildings, it is shown that wind load has a very important effect on the architectural and structural design. The aerodynamic approach to tall buildings is considered in this context, as is earthquake induced lateral loading. Case studies of some of the world ' s most iconic buildings, illustrated with full colour photographs, structural plans and axonometrics, will bring to life the design challenges which they presented to architects and structural engineers. The Empire State Building, the Burj Khalifa, Taipei 101 and the HSB Turning Torso are just a few examples of the buildings whose real-life specifications are used to explain and illustrate core design principles, and their subsequent effect on the finished structure.

Second Century of the Skyscraper

Seismic Response of High-rise Zipper Braced Frame Structures with Outrigger Trusses

A Computer Program to Analyse the Dynamic Response of High Rise Buildings to Nuclear Blast Loading

Designing for Habitability

Foundation Systems for High-Rise Structures

Tall Building Design

Many high-rise buildings are practically irregular as a result of the architectural and service requirements in the design process, errors and modifications during the construction phase, and changes of the building use throughout its service life. Structural irregularities could increase the uncertainties related to the ability of the building to meet the design objectives. This study is thus devoted to assess the safety margins and calibrate the seismic design response factors of modern high-rise buildings with different vertical irregularity features. A brief survey of the most common vertical irregularities in reinforced concrete multi-story buildings is conducted to select reference structures. Five 50-story high-rise buildings are then selected and fully designed using international building codes to represent well-designed tall buildings with principal vertical irregularity types. Fiber-based simulation models are developed to assess the seismic response of the five benchmark buildings under the effect of forty earthquake records representing far-field and near-field seismic scenarios. The comprehensive results obtained from inelastic pushover and incremental dynamic analyses are employed to provide insights into the local and global seismic response of the reference structures. The probabilistic vulnerability assessment of the five high-rise buildings is conducted at different limit states using fragility relationships. The study concluded that the seismic performance of well-designed regular and vertically irregular high-rise buildings is satisfactory under the design earthquake. Under severe earthquakes, the seismic response of tall buildings with extreme soft story and geometric irregularity is not inferior to that of the regular vii counterpart at different seismic performance levels. Despite the overstrength factor adopted in the design of buildings with discontinuities in the lateral-force-resisting system and extreme weak story, the observed negative impacts of these irregularity categories on increasing the vulnerability of high-rise buildings are substantial. This confirms the pressing need for mitigation strategies to reduce the expected seismic losses of the latter classes of building. The calibration of seismic design response factors of the reference high-rise buildings also confirms that, although the code coefficients are adequately conservative, they can be revised to arrive at a more efficient and cost-effective design of regular and irregular high-rise buildings.

This state-of-the-art report describes various facets of the human response to wind-induced motion in tall buildings and identifies design strategies to mitigate the effects of such motion on building occupants.

Many rural fire departments across the United States are now having to deal with fire emergencies in high-rise buildings. The purpose of this research was to understand how rural fire departments respond to fire emergencies in high-rise buildings. The research questions which were answered were: 1) What is the definition used by rural fire departments to describe a high-rise buildings? 2) How much equipment and manpower do rural fire departments respond with for reports of fire alarms at high-rise buildings? 3) Do rural fire departments conduct pre-fire planning inspections of high-rise buildings? 4) Do rural fire departments have written Standard Operating Procedures for response to high-rise fire emergencies?

Report

Across-wind response of high-rise buildings

High-Rise Buildings under Multi-Hazard Environment

High-rise Security and Fire Life Safety

Structural Systems and Aerodynamic Form

This book establishes a proper firefighting mindset and promotes maintaining preparedness for the extreme physical and mental demands of firefighting operations in high-rise and standpipe-equipped buildings ... Among the many valuable topics covered in this book are: standpipe system pressure regulating devices, pressure restricting devices and pressure reducing valves; cautious and disciplined elevator use during high-rise operations; elevator rescue operations; proper engine company suppression selection, including techniques to operate more powerful firefighting weapons with limited manpower; air support operations during high-rise emergencies, with or without an internal resource.

Huge earthquakes and tsunamis have caused serious damage to important structures such as civil infrastructure elements, buildings and power plants around the globe. To quantitatively evaluate such damage processes and to design effective prevention and mitigation measures, the latest high-performance computational mechanics technologies, which include telascale to petascale computers, can offer powerful tools. The phenomena covered in this book include seismic wave propagation in the crust and soil, seismic response of infrastructure elements such as tunnels considering soil-structure interactions, seismic response of high-rise buildings, seismic response of nuclear power plants, tsunami run-up over coastal towns and tsunami inundation considering fluid-structure interactions. The book provides all necessary information for addressing these phenomena, ranging from the fundamentals of high-performance computing for finite element methods, key algorithms of accurate dynamic structural analysis, fluid flows with free surfaces, and fluid-structure interactions, to practical applications with detailed simulation results. The book will offer essential insights for researchers and engineers working in the field of computational seismic/tsunami engineering.

In-depth coverage of the latest tall and super tall building designs and examples from around the world Featuring contributions from 30 global experts involved in the planning and design of the structures covered in this book, Tall and Supertall Buildings describes the technical developments and special design features used for these landmark buildings: Sears Tower * Taipei 101 * Burj Khalifa * Petronas Towers * Shanghai Tower * Kingdom Tower This authoritative resource addresses HVAC systems, sustainability, geotechnical and foundation engineering, wind engineering, and more. Construction photographs and detailed diagrams are included throughout. This is the definitive guide for engineers, architects, project managers, building inspectors, and anyone involved in the planning and design of tall and supertall buildings.

Tall and Super Tall Buildings

Site-dependent Seismic Response of High-rise Buildings to Long-distance Earthquakes

Torsional Response of High-rise Buildings

Effect of Directionality of Ground Motions

Wind-induced Motion of Tall Buildings

IUTAM Symposium on Nonlinear Stochastic Dynamics and Control

Damping Technologies for Tall Buildings provides practical advice on the selection, design, installation and testing of damping systems. Richly illustrated with images and schematics, this book presents expert commentary on different damping systems, giving readers a way to accurately compare between different device categories and gain and understand the advantages and disadvantages of each. In addition, the book covers their economical and sustainability implications. Case studies are included to provide a direct understanding on the possible applications of each device category. Provides an expert guide on the selection and deployment of the various types of damping technologies Drawn from extensive contributions from international experts and research projects that represent the current state-of-the-art and design in damping technologies Includes 25+ real case studies collected with very detailed information on damping design, installation, testing and other building implications

This book presents the results of a Japanese national research project carried out in 1988-1993, usually referred to as the New RC Project. Developing advanced reinforced concrete building structures with high strength and high quality materials under its auspices, the project aimed at promoting construction of highrise reinforced concrete buildings in highly seismic areas such as Japan. The project covered all the aspects of reinforced concrete structures, namely materials, structural elements, structural design, construction, and feasibility studies. In addition to presenting these results, the book includes two chapters giving an elementary explanation of modern analytical techniques, i.e. finite element analysis and earthquake response analysis. Contents:RC Highrise Buildings in Seismic Areas (H Aoyama)The New RC Project (H Hiraishi)New RC Materials (M Abe & H Shiohara)New RC Structural Elements (T Kaminosono)Finite Element Analysis (H Noguchi)Structural Design Principles (M Teshigawara)Earthquake Response Analysis (T Kabeyasawa)Construction of New RC Structures (Y Masuda)Feasibility Studies and Example Buildings (H Fujitani) Readership: Civil, ocean and marine engineers.

Provides structural engineers with the knowledge and practical tools needed to perform structural designs for wind that incorporate major technological, conceptual, analytical and computational advances achieved in the last two decades. With clear explanations and documentation of the concepts, methods, algorithms, and software available for accounting for wind loads in structural design, it also describes the wind engineer's contributions in sufficient detail that they can be effectively scrutinized by the structural engineer in charge of the design. Wind Effects on Structures: Modern Structural Design for Wind, 4th Edition is organized in four sections. The first covers atmospheric flows, extreme wind speeds, and bluff body aerodynamics. The second examines the design of buildings, and includes chapters on aerodynamic loads; dynamic and effective wind-induced loads; wind effects with specified MRIs; low-rise buildings; tall buildings; and more. The third part is devoted to aeroelastic effects, and covers both fundamentals and applications. The last part considers other structures and special topics such as trussed frameworks; offshore structures; and tornado effects. Offering readers the knowledge and practical tools needed to develop structural designs for wind loadings, this book: Points out significant limitations in the design of buildings based on such techniques as the high-frequency force balance Discusses powerful algorithms, tools, and software needed for the effective design for wind, and provides numerous examples of application Discusses techniques applicable to structures other than buildings, including stacks and suspended-span bridges Features several appendices on Elements of Probability and Statistics; Peaks-over-Threshold Poisson-Process Procedure for Estimating Peaks; estimates of the WTC Towers' Response to Wind and their shortcomings; and more Wind Effects on Structures: Modern Structural Design for Wind, 4th Edition is an excellent text for structural engineers, wind engineers, and structural engineering students and faculty.

A Computer Program to Analyze the Dynamic Response of High Rise Buildings to Nuclear Blast Loading

A Computer Program to Analyze the Dynamic Response of High Rise Buildings to Nuclear Blast Loading -

Human Response to Tall Buildings

Wind Effects on Structures

Applications to Simplified Seismic Diagnosis and Retrofit Using the Extended Rod Theory

Super Elements in High-rise Buildings Under Stochastic Wind Load

As part of the structural response research program being conducted for ERDA, the response behavior of high-rise buildings in Las Vegas, Nevada, due to ground motion caused by underground nuclear explosions (UNEs) at the Nevada Test Site (NTS) has been measured for the past 12 years. Results obtained include variation in dynamic response properties as a function of amplitude of motion, influence of nonstructural partitions in the building response, and comparison of calculated and measured response. These data for three reinforced concrete high- rise buildings, all designed as moment-resisting space frames are presented. (auth).

The purpose of the digital computer program described in this Guide is to provide a convenient method for analyzing the response of high-rise structures to lateral nuclear blast loads. The analysis produces displacements and forces throughout the structure as a function of time.

Addresses the Question Frequently Proposed to the Designer by Architects: "Can We Do This? Offering guidance on how to use code-based procedures while at the same time providing an understanding of why provisions are necessary, Tall Building Design: Steel, Concrete, and Composite Systems methodically explores the structural behavior of steel, concrete, and composite members and systems. This text establishes the notion that design is a creative process, and not just an execution of framing proposals. It cultivates imaginative approaches by presenting examples specifically related to essential building codes and standards. Tying together precision and accuracy—it also bridges the gap between two design approaches—one based on initiative skill and the other based on computer skill. The book explains loads and load combinations typically used in building design, explores methods for determining design wind loads using the provisions of ASCE 7-10, and examines wind tunnel procedures. It defines conceptual seismic design, as the avoidance or minimization of problems created by the effects of seismic excitation. It introduces the concept of performance-based design (PBD). It also addresses serviceability considerations, prediction of tall building motions, damping devices, seismic isolation, blast-resistant design, and progressive collapse. The final chapters explain gravity and lateral systems for steel, concrete, and composite buildings. The Book Also Considers: Preliminary analysis and design techniques The structural rehabilitation of seismically vulnerable steel and concrete buildings Design differences between code-sponsored approaches The concept of ductility trade-off for strength Tall Building Design: Steel, Concrete, and Composite Systems is a structural design guide and reference for practicing engineers and educators, as well as recent graduates entering the structural engineering profession. This text examines all major concrete, steel, and composite building systems, and uses the most up-to-date building codes.

Firefighting Operations in High-Rise and Standpipe-Equipped Buildings

Dynamic Response of High-rise Buildings Subjected to Wind Excitation

Rural Response to High Rise Fire Emergencies

Planning and Design

Response of High Rise Buildings to Ambient Forces

Nonlinear Response of High-rise Buildings

This title provides the reader with complete coverage of high-rise security and safety issues. It includes comprehensive sample documentation, diagrams and photographs to aid in developing security and fire life safety programs

Human Response to Tall BuildingsStroudsburg, Pa. : Dowden, Hutchinson & RossTorsional Response of High-rise BuildingsInelastic Response of High-rise Buildings to TornadoesWind-induced Motion of Tall BuildingsDesigning for Habitability

This book presents a simple analytical method based on the extended rod theory that allows the earthquake resistance of high-rise buildings to be easily and accurately evaluated at the preliminary design stage. It also includes practical software for applying the extended rod theory to the dynamic analysis of actual buildings and structures. High-rise buildings in large cities, built on soft ground consisting of sedimentary rock, tend to have low natural frequency. If ground motion due to an earthquake occurs at distant hypocenters, the vibration wave can be propagated through several sedimentary layers and act on skyscrapers as a long-period ground motion, potentially producing a resonance phenomenon that can cause severe damage. Accordingly, there is a pressing need to gauge the earthquake resistance of existing skyscrapers and to improve their seismic performance. This book was written by authors who have extensive experience in tall-building seismic design in Japan. The software included enables readers to perform dynamic calculations of skyscrapers' resistance to vibrations. As such, it offers a valuable resource for practitioners and engineers, as well as students of civil engineering.

Theory, Design Guidance and Case Studies

Damping Technologies for Tall Buildings

Council on Tall Buildings and Urban Habitat

Tall Buildings

Dynamic Response of High-rise Building Subject to Wind Excitation

Inelastic Response of High-rise Buildings to Tornadoes

This book discusses performance-based seismic and wind-resistant design for high-rise building structures, with a particular focus on establishing an integrated approach for performance-based wind engineering, which is currently less advanced than seismic engineering. This book also provides a state-of-the-art review of numerous methodologies, including computational fluid dynamics (CFD), extreme value analysis, structural optimization, vibration control, pushover analysis, response spectrum analysis, modal parameter identification for the assessment of the wind-resistant and seismic performance of tall buildings in the design stage and actual tall buildings in use. Several new structural optimization methods, including the augmented optimality criteria method, have been developed and employed in the context of performance-based design. This book is a valuable resource for students, researchers and engineers in the field of civil and structural engineering.

Since the 1960s, wind tunnel testing has become a commonly used tool in the design of tall buildings. It was pioneered, in large part, during the design of the World Trade Center Towers in New York. Since those early days of wind engineering, wind tunnel testing techniques have developed in sophistication, but these techniques are not widely understood by the designers using the results. As a direct result, the CTBUH Wind Engineering Working Group was formed to develop a concise guide for the non-specialist. The primary goal of this guide is to provide an overview of the wind tunnel testing process for design professionals. This knowledge allows readers to ask the correct questions of their wind engineering consultants throughout the design process. This is not an in-depth guide to the technical intricacies of wind tunnel testing, it focusses instead on the information the design community needs, including: a unique methodology for the presentation of wind tunnel results to allow straightforward comparison of results from different wind tunnel laboratories. advice on when a tall building is likely to be sufficiently sensitive to wind effects to benefit from a wind tunnel test background for assessing whether design codes and standards are applicable details of the types of tests that are commonly conducted descriptions of the fundamentals of wind climate and the interaction of wind and tall buildings This unique book is an essential guide for all designers of tall buildings, and anyone else interested in the process of wind tunnel testing for tall buildings.

Few subjects have caught the attention of the entire world as much as those dealing with natural hazards. The first decade of this new millennium provides a litany of tragic examples of various hazards that turned into disasters affecting millions of individuals around the globe. The human losses (some 225,000 people) associated with the 2004 Indian Ocean earthquake and tsunami, the economic costs (approximately 200 billion USD) of the 2011 Tohoku Japan earthquake, tsunami and reactor event, and the collective social impacts of human tragedies experienced during Hurricane Katrina in 2005 all provide repetitive reminders that we humans are temporary guests occupying a very active and angry planet. Any examples may have been cited here to stress the point that natural events on Earth may, and often do, lead to disasters and catastrophes when humans place themselves into situations of high risk. Few subjects share the true interdisciplinary dependency that characterizes the field of natural hazards. From geology and geophysics to engineering and emergency response to social psychology and economics, the study of natural hazards draws input from an impressive suite of unique and previously independent specializations. Natural hazards provide a common platform to reduce disciplinary boundaries and facilitate a beneficial synergy in the provision of timely and useful information and action on this critical subject matter. As social norms change regarding the concept of acceptable risk and human migration leads to an explosion in the number of megacities, coastal over-crowding and unmanaged habitation in precarious environments such as mountainous slopes, the vulnerability of people and their susceptibility to natural hazards increases dramatically. Coupled with the concerns of changing climates, escalating recovery costs, a growing divergence between more developed and less developed countries, the subject of natural hazards remains on the forefront of issues that affect all people, nations, and environments all the time. This treatise provides a compendium of critical, timely and very detailed information and essential facts regarding the basic attributes of natural hazards and concomitant disasters. The Encyclopedia of Natural Hazards effectively captures and integrates contributions from an international portfolio of almost 300 specialists whose range of expertise addresses over 330 topics pertinent to the field of natural hazards. Disciplinary barriers are overcome in this comprehensive treatment of the subject matter. Clear illustrations and numerous color images enhance the primary aim to communicate and educate. The inclusion of a series of unique “classic case study” events interspersed throughout the volume provides tangible examples linking concepts, issues, outcomes and solutions. These case studies illustrate different but notable recent, historic and prehistoric events that have shaped the world as we now know it. They provide excellent focal points linking the remaining terms in the volume to the primary field of study. This Encyclopedia of Natural Hazards will remain a standard reference of choice for many years.

High-Performance Computing for Structural Mechanics and Earthquake/Tsunami Engineering

Assessment and Design for Optimal Performance

Earthquake and Ambient Dynamic Response of a Modern High-rise Building

Steel, Concrete, and Composite Systems

Wind Tunnel Testing of High-Rise Buildings

Simplified Dynamic Analysis of High-Rise Buildings

Non-linear stochastic systems are at the center of many engineering disciplines and progress in theoretical research had led to a better understanding of non-linear phenomena. This book provides information on new fundamental results and their applications which are beginning to appear across the entire spectrum of mechanics. The outstanding points of these proceedings are Coherent compendium of the current state of modelling and analysis of non-linear stochastic systems from engineering, applied mathematics and physics point of view. Subject areas include: Multiscale phenomena, stability and bifurcations, control and estimation, computational methods and modelling. For the Engineering and Physics communities, this book will provide first-hand information on recent mathematical developments. The applied mathematics community will benefit from the modelling and information on various possible applications.

Assessment of Multi-story Building Seismic Design Factors with Structural Irregularity

Measurement and Evaluation of High-rise Building Response to Ground Motion Generated by Underground Nuclear Explosions

Encyclopedia of Natural Hazards

Modern Structural Design for Wind

Torsional Response and Design of High-rise Buildings

Public Buildings Service International Conference on Firesafety in High-Rise Buildings