Seismic Design Aids for Nonlinear Pushover Analysis of Reinforced Concrete And Steel Bridges Advances In Earthquake Engineering

Tools to Safeguard New Buildings and Assess Existing Ones Nonlinear analysis methods such as static pushover are generally considered a reliable tool for seismic and structural assessment. But the accuracy of seismic capacity estimates—which can prevent catastrophic loss of life and astronomical damage repair costs—depends on the use of the correct basic input parameters. Seismic Design Aids for Nonlinear Analysis of Reinforced Concrete Structures simplifies the estimation of those vital parameters. This book makes the mistake of confusing seismic force and acceleration in the nonlinear seismic analyses in earthquake engineering. The complexity of concrete, steel, and reinforcement may result in a solution error that leads to incorrect assessment or interpretation. Streamlined Analysis Using a Mathematical Model: To achieve a more accurate pushover analysis and improve general performance-based design, this book assesses new key inputs, including axial force–moment coupling, yield strength, curvature, and moment–rotation behavior. It analyzes these boundaries using a detailed mathematical model of reinforced concrete sections based on international codes, and then proposes design curves and tables derived from the authors’ studies using a variety of nonlinear tools, computer programs, and software. The text reviews relevant literature and describes mathematical modeling, detailing numerical procedures step by step. Including supplementary online material that can be used to compute any parameter, this reference delineates nonlinear properties of materials so that they can be used instantly for seismic analysis without having to solve cumbersome equations.

In the last ten to fifteen years a vast amount of research has been undertaken to improve on earlier methods for analyzing the seismic reliability of structures. These efforts focused on identifying aspects of prominent relevance and disregarding the less important ones, with the goal of producing methods that are both more efficient and easier to use in practice. Today this goal can be said to be substantially achieved. During these years scientific activity covered all of the many aspects involved in this research area, ranging from theoretical studies to specific applications and methodologies. The development of these techniques has led to the progress of this research, which also determined the development of numerous technical papers, including the first guidelines for earthquake-resistant design. This book is the first in the series and provides general guidance. The companion Part II, Part III, the Book and Vibration DesignAids For Offshore Toppies Platform Under Special Loads

Building structures are unique in the field of engineering, as they pose challenges in the development and conceptualization of their design. As more innovative structural forms are envisioned, detailed analyses using computer tools are inevitable. This book gathers 23 papers by top experts from 11 countries, presented at the 3rd Houston International Forum: Concrete Structures in Earthquake. Designing infrastructures to resist earthquakes has always been the focus and mission of scientists and engineers located in technologically advanced regions, especially around the Pacific Rim of Fire including China, Japan, and the USA. The pace of research and innovation has accelerated in the past three decades, reflecting the need to mitigate the risk of severe damage to interconnected infrastructures, and to facilitate the incorporation of high-speed computers and the Internet. The respective papers focus on the design and analysis of concrete structures subjected to earthquakes, advance the state of the art on the role of computer-aided earthquake engineering, and suggest guidelines for future research. Building structures are unique in the field of engineering, as they pose challenges in the development and conceptualization of their design. As more innovative structural forms are envisioned, detailed analyses using computer tools are inevitable. This book enables readers to gain an overall understanding of computer-aided analysis of various types of structural forms using advanced tools such as MATLAB. Detailed descriptions of the fundamentals are explained in a "classroom" style, which will make the content more user-friendly and easier to understand. Basic concepts are emphasized through simple illustrative examples and exercises, and analysis methodologies and guidelines are explained through numerous example problems.

In September 2014, the Applied Technology Council (ATC) convened a task order project under National Institute of Standards and Technology (NIST) Contract 1431-13-C-0209 to develop guidelines for nonlinear dynamic analysis (ATC-114 Project). The need for such guidelines is identified as high-priority research and development topic. Proposed Research Initiative 4 in NIST GCN 14-517-27 report, Nonlinear Analysis and Development Program For Performance-Based Seismic Engineering (NIBS, 2013). This report summarizes the findings and development of the ATC-114 Project. The ATC-114 project is soliciting interests in developing guidelines for nonlinear dynamic analysis of structures. This initiative is intended to provide computational guidelines to support performance-based seismic analysis. In addition, the NIST GCN 14-517-2 report, Research Required to Support Full Implementation of Performance-Based Seismic Design (NIBS, 2013), also identified the need to improve guidelines for nonlinear dynamic analysis, especially with regard to the collapse performance of structures, including collapse-resilient structures. At the 12th International Conference on Earthquake Engineering (1994) that the development of guidelines for the design and analysis of structures subjected to earthquakes is recommended. The lack of guidelines for the safety of infrastructures for the generation of guidelines for earthquake engineering. The ATC publication, "Guidelines for Seismic Design of Reinforced Concrete Structures", which is a companion document to this work, provides guidance specific to the following two structural systems: structural steel moment frames and reinforced concrete moment frames. This book is a companion to the ATC-114 Project guidelines for further details about nonlinear dynamic analysis and reinforced concrete moment frames, respectively. It is expected that these guidelines will be used in conjunction with available performance-assessment provisions, or their equivalent, that are appropriate for the specific circumstances.
Earthquake Geotechnical Engineering for Protection and Environment and Developments contains invited, keynote and theme lectures and regular papers presented at the 7th International Conference on Earthquake Geotechnical Engineering (ICEG7, 2019) held in Bucharest, Romania. The contributions to this book provide a comprehensive and critical review of the state of the art and offer a unique perspective and critical insight to some of the most pressing and timely issues of environmental phenomena induced by earthquakes in soils and their effects on engineered systems interacting with them. The book is divided in the sections below: Invited papers, Keynote papers, Theme lectures and Presentations. The book will provide a valuable reference for researchers, practitioners and educational institutions involved in research and development of earthquake engineering, geophysics and related areas.

Offshore platforms face many risks, including a hostile ocean environment, extreme temperatures, overpressure loads, fire risks, and hydrocarbon explosions, all of which pose unique challenges in designing their topsides. The topside design involves the selection of appropriate materials, including structural steel and reinforced concrete, as well as ordinary and high-strength steel, and the development of efficient geometries for the platform. This book provides a comprehensive overview of the latest developments in offshore platform design, including the selection of materials, the design of structural members, and the analysis and verification of the overall system. It is intended for engineers and designers involved in the design and construction of offshore platforms.

This book discusses the impact of long-period ground motions on structural design using the situation in Bucharest, the capital city of Romania, as a case study. The first part explores the seismic hazard situation in Bucharest, and the causes of damaging earthquakes. The second part focuses on the dynamic response of structures due to long-period ground motions. The third part investigates the implications of the seismic hazard situation and the results from the previous two parts. Several case study buildings in Bucharest are presented and the major difficulties encountered in their design are considered. The book also includes various numerical examples that help readers understand the impact of long-period ground motions on various structural systems, that are currently used in Bucharest. This book is intended for researchers in the field of seismic hazard and risk assessment and designers of multi-story buildings in seismic areas.

This book is the latest in the series of books that provide comprehensive guidance on the design and analysis of reinforced concrete structures. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures, including architects, structural engineers, and construction managers. The book provides a comprehensive overview of the latest developments in reinforced concrete design, including the selection of materials, the design of structural members, and the analysis and verification of the overall system. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures.

This book is intended for researchers in the field of seismic hazard and risk assessment and designers of multi-story buildings in seismic areas. It provides a comprehensive overview of the latest developments in reinforced concrete design, including the selection of materials, the design of structural members, and the analysis and verification of the overall system. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures.

This book is the latest in the series of books that provide comprehensive guidance on the design and analysis of reinforced concrete structures. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures, including architects, structural engineers, and construction managers. The book provides a comprehensive overview of the latest developments in reinforced concrete design, including the selection of materials, the design of structural members, and the analysis and verification of the overall system. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures.

This book is the latest in the series of books that provide comprehensive guidance on the design and analysis of reinforced concrete structures. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures, including architects, structural engineers, and construction managers. The book provides a comprehensive overview of the latest developments in reinforced concrete design, including the selection of materials, the design of structural members, and the analysis and verification of the overall system. It is intended for engineers and designers involved in the design and construction of reinforced concrete structures.
A unified performance-based seismic design procedure is proposed and successfully implemented in this dissertation. It aims to provide the progressive collapse sequence of damaged bridges when subjected to major earthquakes. Seismic Design Aids for Nonlinear Pushover Analysis of Reinforced Concrete and Steel Bridges fills the need for a complete reference on load–moment interaction (PM) Constant moment ratio (CMR) Plastic hinge length (PHL) Ranging from the simplest to the most sophisticated, the methods are suitable for engineers with varying levels of experience in nonlinear structural analysis. The book: Focuses on structural reliability Deliberates on fracture and fatigue and examines their application in marine structures Introduces ideas on the retrofit and renovation of marine structures Examines the design of offshore structures for the different load cases and loads. 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.

[Revised content]...