Seismic Soil Structure Interaction Analysis In Time Domain

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Methodologies for Seismic Soil-Structure Interaction Analysis in the Design and Assessment of Nuclear Installations Elsevier
Proceedings of the NATO Advanced Research Workshop on Coupled Site and Soil-Structure Interaction Effects with Application to Seismic Risk Mitigation Borovets, Bulgaria 30 August - 3 September 2008

Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions Springer Science & Business Media
The cooperative program between NRC/ANL and EPRI on the validation of soil-structure interaction analysis methods with actual seismic response data is described. A large scale-model of a containment building has been built by EPRI/Taipower in a highly seismic region of Taiwan. Vibration tests were performed, first on the basemat before the superstructure was built and then on the completed structure. Since its completion, the structure has experienced many earthquakes. The site and structural response to these earthquakes have been recorded with field (surface and downhole) and structural instrumentation. The validation program involves blind predictions of site and structural response during vibration tests and a selected seismic event, and subsequent comparison between the predictions and measurements. The predictive calculations are in progress. The results of the correlation are expected to lead to the evaluation of the methods as to their conservatisms and sensitivities.

State-of-the-art procedures John Wiley & Sons
Dynamic Soil-structure interaction is one of the major topics in earthquake engineering and soil dynamics since it is closely

related to the safety evaluation of many important engineering projects, such as nuclear power plants, to resist earthquakes. In dealing with the analysis of dynamic soil-structure interactions, one of the most difficult tasks is the modeling of unbounded media. To solve this problem, many numerical methods and techniques have been developed. This book summarizes the most recent developments and applications in the field of dynamic soil-structure interaction, both in China and Switzerland. An excellent book for scientists and engineers in civil engineering, structural engineering, geotechnical engineering and earthquake engineering.

Dynamic Soil-structure Interaction Springer Science & Business Media

Soil-structure interaction (SSI) effects are relevant for the seismic analysis of tall buildings on shallow foundations since the dynamic behavior of structures is highly affected by the interaction between the superstructure and supporting soils. As part of earthquake-resistant designs of buildings, considering SSI effects in the analysis provides more realistic estimates of its performance during a seismic event, particularly when both the structure and soil undergo large demands that can compromise serviceability. Oversimplifications of structural or soil modeling in the analysis introduces variability and biases in the computed seismic response.

A review of the analysis of seismic soil-structure interaction Springer

For the last couple of decades it has been recognized that the foundation material on which a structure is constructed may interact dynamically with the structure during its response to dynamic excitation to the extent that the stresses and deflections in the system are modified from the values that would have been developed if it had been on a rigid foundation. This phenomenon is examined in detail in the book. The basic solutions are examined in time and frequency domains and finite element and boundary element solutions compared. Experimental investigations aimed at correlation and verification with theory are described in detail. A wide variety of SSI problems may be formulated and solved approximately using simplified models in lieu of rigorous procedures; the book gives a good overview of these methods. A feature which often lacks in other texts on the subject is the way in which dynamic behavior of soil can be modeled. Two contributors have addressed this problem from the computational and physical characterization viewpoints. The book illustrates practical areas with the analysis of tunnel linings and stiffness and damping of pile groups. Finally, design code provisions and derivation of design input motions complete this thorough overview of SSI in conventional engineering practice. Taken in its entirety the book, authored by fifteen well known experts, gives an in-depth review of soil-structure interaction across a broad spectrum of aspects usually not covered in a single volume. It should be a readily useable reference for the research worker as well as the advance level practitioner.

(abstract) This book treats the dynamic soil-structure interaction phenomenon across a broad spectrum of aspects ranging from basic theory, simplified and rigorous solution techniques and their comparisons as well as successes in predicting experimentally recorded measurements. Dynamic soil behavior and practical problems are given thorough coverage. It is

intended to serve both as a readily understandable reference work for the researcher and the advanced-level practitioner.

Soil-structure Interaction Analysis for Large Scale Seismic Test at Lotung ASV Construction

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 ABAQUAS 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/dattaseismic

EPRI/NRC/TPC Workshop on Seismic Soil-Structure Interaction Analysis Techniques Using Data from Lotung, Taiwan Soil-structure interaction in seismic analysis

Soil-structure interaction (SSI) is an important phenomenon in the seismic response analysis. As seismologists describe seismic excitation in terms of the seismic motion of certain control point at the free surface of the initial site, the question is whether the same point of the structure (after structure appears) will have the same seismic response motion in case of the same seismic event. If yes, then seismic motion from seismologists is directly applied to the base of the structure (it is called “fixed-base analysis”), and they say that “no SSI occurs”’ (though literally speaking soil is forcing structure to move, so interaction is always present). This is a conventional approach in the field of civil engineering. However, if heavy and rigid structure (sometimes embedded) is erected on medium or soft soil site, this structure changes the seismic response motion of the soil as compared to the initial free-field picture. Such a situation is typical for Nuclear Power Plants (NPPs), deeply embedded structures, etc. The book describes different approaches to SSI analysis and different SSI

effects. Special attention is paid to the Combined Asymptotic Method (CAM) developed by the author and used for the design of NPPs in seismic regions. Nowadays, some civil structures have parameters comparable to those of NPPs (e.g., masses and embedment), so these approaches become useful for the civil structural engineers as well.

A Study of Parameters Important to Soil-structure Interaction in Seismic Analyses of Nuclear Power Plants CRC Press

During the last decade, the state-of-the-art in Earthquake Engineering Design and Analysis has made significant steps towards a more rational analysis of structures. This book reviews the fundamentals of displacement based methods. Starting from engineering seismology and earthquake geotechnical engineering, it proceeds to focus on design, analysis and testing of structures with emphasis on buildings and bridges.

Seismic soil/structure interaction analysis guidelines KIT Scientific Publishing

Soil-structure interaction in seismic analysisASV Construction

Current Research in China and Switzerland Springer

The 241-SY-101 tank is a double-shell waste storage tank buried in the 241-SY tank farm in the 200 West Area of the Hanford Site. This analysis addresses the effects of seismic soil-structure interaction on the tank structure and includes a parametric soil-structure interaction study addressing three configurations: two-dimensional soil structure, a two-dimensional structure-soil-structure, and a three-dimensional soil-structure interaction. This study was designed to determine an optimal method for addressing seismic-soil effects on underground storage tanks. The computer programs calculate seismic-soil pressures on the double-steel tank walls and seismic acceleration response spectra in the tank. The results of this soil-structure interaction parametric study as produced by the computer programs are given in terms of seismic soil pressures and response spectra. The conclusions of this soil-structure interaction evaluation are that dynamically calculated soil pressures in the 241-SY-101 tank are significantly reduced from those using standard hand calculation methods and that seismic evaluation of underground double-shell waste storage tanks must consider soil-structure interaction effects in order to predict conservative structural response. Appendixes supporting this study are available in Volume 2 of this report.

Critical Soil-Structure Interaction Analysis Considerations for Seismic Qualification of Safety Equipment Elsevier

This report summarizes the SASSI analyses of a deeply embedded reactor model performed by BNL and CJC and Associates, as part of the seismic soil-structure interaction (SSI) simulation capability project for the NEAMS (Nuclear Energy Advanced Modeling and Simulation) Program of the Department of Energy. The SASSI analyses included three cases: 0.2 g, 0.5 g, and 0.9g, all of which refer to nominal peak accelerations at the top of the bedrock. The analyses utilized the modified subtraction method (MSM) for performing the seismic SSI evaluations. Each case consisted of two analyses: input motion in one horizontal direction (X) and input motion in the vertical direction (Z), both of which utilized the same in-column input motion. Besides providing SASSI results for use in comparison with the time domain SSI results obtained using the DIABLO computer code, this study also leads to the recognition that the frequency-

domain method should be modernized so that it can better serve its mission-critical role for analysis and design of nuclear power plants.

Proceedings of the 7th International Conference on Earthquake Geotechnical Engineering, (ICEGE 2019), June 17-20, 2019, Rome, Italy Prentice Hall

This edited volume brings together findings and case studies on fundamental and applied aspects of structural engineering, applied to buildings, bridges and infrastructures in general. It focuses on the application of advanced experimental and numerical techniques and new technologies to the built environment. This volume is part of the proceedings of the 1st GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2017.

Uncertainty in Soil-structure Interaction Analysis Arising from Differences in Analytical Techniques Springer Science & Business Media

Despite advances in the field of geotechnical earthquake engineering, earthquakes continue to cause loss of life and property in one part of the world or another. The Third International Conference on Soil Dynamics and Earthquake Engineering, Princeton University, Princeton, New Jersey, USA, 22nd to 24th June 1987, provided an opportunity for participants from all over the world to share their expertise to enhance the role of mechanics and other disciplines as they relate to earthquake engineering. The edited proceedings of the conference are published in four volumes. This volume covers: Soil Structure Interaction under Dynamic Loads, Vibration of Machine Foundations, and Base Isolation in Earthquake Engineering. With its companion volumes, it is hoped that it will contribute to the further development of techniques, methods and innovative approaches in soil dynamics and earthquake engineering.

Dynamic Soil-Structure Interaction

Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions contains invited, keynote and theme lectures and regular papers presented at the 7th International Conference on Earthquake Geotechnical Engineering (Rome, Italy, 17-20 June 2019. The contributions deal with recent developments and advancements as well as case histories, field monitoring, experimental characterization, physical and analytical modelling, and applications related to the variety 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 Special Session on Large Scale Testing Special Session on Liquefact Projects Special Session on Lessons learned from recent earthquakes Special Session on the Central Italy earthquake Regular papers Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions provides a significant up-to-date collection of recent experiences and developments, and aims at engineers, geologists and seismologists, consultants, public and private contractors, local national and international authorities, and to all those involved in research and practice related to Earthquake Geotechnical Engineering.

Soil Structure Interaction Analysis for the Hanford Site 241-SY-101 Double-shell Waste Storage Tanks

The response of a nuclear installation's structure during an earthquake depends on the characteristics of the ground motion, the surrounding soil and the structure itself.

Analysis and Computation of Seismic Soil Structure Interaction Effects

This work handles the seismic soil- and water structure interaction of navigation locks in the field of elastodynamics. The investigation is based on numerical analysis with the finite element method. The findings extend the results of available theories and studies and allow for a more precise analysis and design of such structures. Suggestions about the numerical analysis of such problems are also presented. The results can be used also for quay and retaining walls. This work was published by Saint Philip Street Press pursuant to a Creative Commons license permitting commercial use. All rights not granted by the work's license are retained by the author or authors.

Facing the Challenges in Structural Engineering

The purpose of this project is to investigate the validity of seismic soil-foundation-structure interaction analysis of a typical California highway bridge structure subjected to near-fault ground motions. A three-dimensional nonlinear finite element model of Meloland Road Overcrossing was developed. The model included a combination of elements including shell elements for the bridge deck. The column and piles were modeled using frame elements. Abutment-backfill and ground soil were simulated using nonlinear springs. The complete bridge system was subjected to three-component recorded free-field earthquake motions. The resulting dynamic response of the bridge model was found to be in close agreement with motions recorded at various locations on the bridge. This validates the practical application and methodology of this project and may be used for evaluating the seismic response of other typical bridges.

Seismic Soil/structure Interaction Analysis Guidelines

This book collects 4 keynote and 15 theme lectures presented at the 2nd European Conference on Earthquake Engineering and Seismology (2ECEES), held in Istanbul, Turkey, from August 24 to 29, 2014. The conference was organized by the Turkish Earthquake Foundation - Earthquake Engineering Committee and Prime Ministry, Disaster and Emergency Management Presidency under the auspices of the European Association for Earthquake Engineering (EAEE) and European Seismological Commission (ESC). The book’s nineteen state-of-the-art chapters were written by the most prominent researchers in Europe and address a comprehensive collection of topics on earthquake engineering, as well as interdisciplinary subjects such as engineering seismology and seismic risk assessment and management. Further topics include engineering seismology, geotechnical earthquake engineering, seismic performance of buildings, earthquake-resistant engineering structures, new techniques and technologies, and managing risk in seismic regions. The book also presents the First Professor Inge Lehmann Distinguished Award Lecture given by Prof. Shamita Das in honor of Prof. Dr. Inge Lehmann. The aim of this work is to present the state-of-the art and latest practices in the fields of earthquake engineering and seismology, with Europe’s most respected researchers addressing recent and ongoing developments while also proposing innovative avenues for future research and development. Given its cutting-edge conten t and broad

spectrum of topics, the book offers a unique reference guide for researchers in these fields. Audience: This book is 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.

Stochastic Analysis of Seismic Soil-structure Interaction

While developing seismic analysis models for buildings that support safety-related equipment, a number of issues should be considered to ensure that the input motions for performing seismic qualification of safety-related equipment are properly defined. These considerations are listed and discussed here with special attention to the effect and importance of the interaction among the foundation soil, the building structure, the equipment anchors, and the equipment structure. Typical industry practices are critically examined to assess their adequacy for determining the input motions for equipment seismic qualification. The features that are considered essential in a soil-structure interaction (SSI) model are described. Also, the effects of inappropriate treatment or representation of these features are discussed.

Seismic soil structure interaction of navigation locks