Abstracts of Papers in English

FEASIBILITY OF REINFORCING OF CEMENT COMPOSITE WITH SOME OF NATURAL FIBERS OBTAINED FROM WASTE

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Key Words: cement composite, fibres, flexural strength, elasticity modulus.

Abstract

Over the past years, application of fibres in cement matrix to enhance the characteristics of cement composites has been considered by researchers. Each of cement composites has a different behaviour in environmental conditions and undertaking the exerted loads. This behaviour depends on the four substantial factors: type of fibres, proportion of fibres in mix design, manufacturing method and admixture materials. In this research, to recognise the flexural behaviour of cement composites which were made by natural fibres, three groups of laboratory specimens have been designed, made and tested. To make the cement composite boards, in the first group, specimens were made by sugar cane stem (bagasse) fibres, in the second group , eucalyptus stem and in the third group, Kraft fibres obtained from waste brown paper, have been considered. In each group, different weight percentage of fibres/cement ratio was investigated. Flexural strength and Yung modulus for specimens were measured and compared with control sample (without fibre). Also to recognise the composites microstructure, Scanning Electronic Microscopic (SEM) studies were carried out.

The results show that bagasse and Kraft fibres have appropriate behaviour in increasing ductility and flexural strength of the composites and the eucalyptus fibres have no significant effect in comparison to control sample.

A PRACTICAL APPROACH FOR LIQUEFACTION ANALYSIS USING PIEZOCONE (CPTu) DATA

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Key Words: liquefaction, cone tip resistant, sand, pore pressure, soil behaviour type chart.

Abstract

Soil liquefaction can induce significant financial damage during earthquakes. Based on in-situ testing results, several methods for soil liquefaction evaluation have been developed in the past. Due to continuous and precise records, the piezocone (CPTu) has gained wide acceptance among other in-situ tests. In this paper, various analytical and descriptive liquefaction assessment approaches have been evaluated. Ten CPTu soundings derived from different sites that have experienced earthquakes were used for evaluation of the current approaches. Liquefaction assessments based on analytical methods presented in the past are rather complex. In this study, by using the data from these ten CPTu soundings, an area called the "zone of potentially liquefiable soils" was introduced over Robertson(1990) and Eslami-Fellenius(2004) soil behavior type charts. This area can indicate the soil types that are most susceptible to liquefaction. The results of liquefaction prediction by the proposed approach demonstrate good accuracy and consistency with the current methods.

LINEAR ANALYSIS OF ON-GROUND OIL RESERVOIRS WITH ENDURANCE TIME METHOD, USING REAL EARTHQUAKE COMPATIBLE ACCELERATION FUNCTIONS

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Key Words: endurance time method, on-ground steel tanks, finite elements method, time history analyses, fluid-structure interaction.

Abstract

This paper aims at the analysis and behavior study of cylindrical on-ground oil reservoirs using the endurance time (ET) method with acceleration functions that are compatible with real earthquake accelerograms, and comparing the results with those obtained from acceleration functions that are compatible with standard code 2800 design spectra. An anchored cylindrical reservoir has been studied using a finite element procedure that includes the fluid elements of the content to model structure-fluid interaction. A linear analysis using static, modal, response spectrum and time-history procedures has been conducted and the results have been compared with those in literature. After model verification, time-history analyses were conducted by considering a set of seven earthquake records; three code 2800 compliant ET acceleration functions and three earthquake compliant ET acceleration functions and the results were compared. The results show that both ET acceleration function sets predict stress and deformations with reasonable accuracy, but for reliable prediction of the maximum height of sloshing, real earthquake compatible acceleration functions have to be used.

INVESTIGATION AND SUGGESTIONS FOR OPTIMUM WEB REDUCED DEPTH RBS CONNECTIONS

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Key Words: reduced beam section, dogbone connections, reducing beam's depth, cyclic loading, finite element method.

Abstract

Investigations following the 1994 Northridge earthquake in California showed that conventional BWWF (Bolted Web Welded Flange) connections in steel moment resisting frames were damaged during the ground motion. According to scientists investigations, the RBS (Reduced Beam Section) connection was introduced, in which the beam section tapers locally in a region near the column face. This induces the plastic hinge away from the column face and dissipates the energy of the seismic loads. This paper describes a new and improved RBS connection. This enables the section to be loaded more heavily without compromising its lateral buckling resistance. An extensive parametric study has been undertaken to evaluate the performance of the connection. Also a new criterion is proposed that describes the strength degradation beyond the maximum carrying capacity of the section.

DETERMINATION OF PROPER TIME STEP FOR DYNAMIC ANALYSIS OF BRIDGES UNDER MOVING LOADS

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Key Words: bridge, moving load, dynamic analysis, time step.

Abstract

In the analysis of structures under dynamic loads, selection of a proper time step has great influence on reaching exact results. In this research, determination of the proper time step in the dynamic analysis of railway bridges under high speed moving loads is considered. Dynamic responses of four simple span steel bridges, with lengths of 10, 15, 20 and 25 meters, to moving trains with speeds from 100 to 400 km/h and axle distances from 13 to 23 meters, are calculated, considering different time steps in the analysis.
The results indicate that increasing the moving speed of vehicles (increase in loading speed), reduces the length of the proper time step for dynamic analysis. In contrast, by increasing span length (increase in bridge vibration period), longer time steps can be used in dynamic analysis. In this research by investigation of dynamic analysis results, an equation is suggested for determination of proper time step for dynamic analysis of bridges under moving loads.

HORIZONTAL UNIFORM HAZARD SPECTRA FOR DIFFERENT SOUTHERN PARTS OF TEHRAN

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Key Words: seismic hazard assessment, seismic parameters, uniform hazard spectra, south of Tehran.

Abstract

Tehran, the capital of Iran, needs a very precise investigation of seismicity and seismic hazard, due to a population exceeding 10 million and the existence of major political, economical, social and cultural centers. The present research has been undertaken in the southern part of Tehran. A set of historical and instrumentally recorded seismic data have been employed, covering a timeline from 4 centuries BC up to now, and the seismic sources were modeled in a radius of 200 km around Tehran. In order to assess the seismicity parameters, Kijko's method has been used. The spectral attenuation relationships of Ambraseys, Simpson & Bommer (1996), were used. A probabilistic seismic hazard evaluation was performed on a grid of 16× 9 points in the southern part of Tehran, using SEISRISK III. The corresponding results have been depicted by horizontal spectral acceleration maps and horizontal uniform hazard mean, and mean plus one, standard deviation spectra, with 2% and 10% PE, over 50 years for different municipality zones of southern Tehran.

EVALUATION OF STATE LINES IN SAND-SILT MIXTURES BY MEANS OF CYCLIC TRIAXIAL TESTS

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Key Words: phase line, sand-silt mixtures and cyclic triaxial test.

Abstract

Liquefaction of saturated sandy soils during earthquakes is a well known phenomenon that has attracted a great deal of attention during the last three decades. Most research has focused on the liquefaction of saturated sandy soils, whereas real soil is rarely made up of clean sand. Therefore, the liquefaction of sandy soils mixed with plastic and non-plastic clays or silty soils has become important. Although there is much research on the liquefaction of these types of mixed soil, some aspects of their behavior have not yet been discovered.
In the current study, the effect of anisotropic consolidation, as well as stress reversal, on the behavior of sandy soils mixed with different percentages of non-plastic silt, is investigated. A total number of 67 cyclic triaxial tests are conducted. It is concluded that the angle of the Initial Phase Transformation Line (IPTL) in q-P' space is strongly affected by the degree of stress reversal. Moreover, the percentage of fine content and initial isotropic and anisotropic consolidation has a clear effect on the angle of IPTL in q-P' space.

ANALYSIS OF VISCO-PLASTIC DISPLACEMENTS AROUND A CIRCULAR TUNNEL CONSIDERING THE MOHR-COULOMB YIELD CRITERION

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Key Words: viscoplastic model, circular tunnel, burger body, creep.

Abstract

Induced deformations in the excavating time of a tunnel depend on the advancement of the tunnel, rheological properties of the surrounding ground, and the age of the support system installment. In this paper, the analysis of circular tunnels in a hydrostatic stress field for viscoplastic behavior is studied. Using the Mohr-Coulomb yield criterion in such a condition, a new model to predict the time-dependent deformation of the tunnel wall is proposed. As an example, the proposed model is used in an investigational tunnel in France. Results obtained from the new proposed relationships were compared with numerical analysis using the Flac code.

STUDY OF TORSIONAL RESPONSES OF ASYMMETRIC BUILDINGS USING TUNED MASS DAMPERS

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Key Words: tuned mass damper, torsion, asymmetric building, soft and stiff edge, passive control.

Abstract

Torsion in buildings has an important effect on buildings during earthquakes. For reduction of these effects, different strategies are presented. One of these strategies is structural control with tuned mass dampers. In this study, a passive tuned mass damper is proposed for the control of torsion in one axis asymmetric buildings subjected to earthquake. The stiffness and damping of this system are divided into two, subspring and subdamper elements, and mounted on stiff and flexible edges of the building. Results of the analysis of the building, subjected to seven far field earthquake records, show that the proposed TMD has a good ability in reducing the torsion of the building, especially a reduction in drift at the soft edge.

PILE AXIAL BEARING CAPACITY ASSESSMENT BY CPTu DATA IN MARINE ENVIRONMENTS OF IRAN

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Key Words: bearing capacity, marine environment, driven piles, dynamic testing, cone penetration test (CPT & CPTu).

Abstract

This paper evaluates the applicability of five current direct cone penetration test (CPT and CPTu) methods, to calculate the ultimate bearing capacity of 13 circular steel driven friction piles, which were driven in marine environments of Iran, in comparison to pile driving analyzer (PDA) data. PDA data was used to determine the measured load bearing capacities from dynamic testing. Pile capacities determined from the different methods were compared with the measured pile capacity obtained during dynamic testing. Four statistical criteria were selected as bases of evaluation. Results of the compression showed that the CPT and CPTu methods have acceptable accuracy to calculate the axial bearing capacity of piles. Therefore, a combination of CPTu data with dynamic test results can be considered by engineers for calculating the axial bearing capacity of piles in offshore structure practices.

NUMERICAL ANALYSIS OF INTERACTION BETWEEN SOIL AND LARGE FOUNDATIONS, CONSIDERING SIZE EFFECTS

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Key Words: numerical analysis, interaction, size effect foundation, soil behavior properties, failure mechanism, localization.

Abstract

In this paper, the behavioral properties of soil beneath and around foundations, including interaction between the soil and the foundation, are studied numerically. To achieve this purpose, two dimensional models with a constant domain under a uniformly distributed load for both large and small foundations have been analyzed using ANSYS software, version 8.1. The results of this analysis clearly show that soil behavior beneath and around small foundations is shearing, which is the same as the predicted behavior and accepted failure mechanisms that most researchers believe in.

However, based on results obtained from this research, the earth located in central areas, as well as under large foundations, is mainly under compressive and comprehensive stresses having a hardening plastic behavior. Consequently, the bearing increases and, hence, stress concentration, as well as deformations, are towards this region. With respect to the fact that loading is constant, regions outside the foundation beneath (the sides) undergo unloading (localization). Thus, the failure mechanism in large foundations is in the form of the interior, as well as forming a resistant and bearing column beneath the foundation. In other words, soil behavior and properties will change as the foundation geometry changes.
Accordingly, with regard to geometry increase, as well as type of soil, as behavioral features change, the stiffness matrix will change also, which will be in the form of coupled.

THE EFFECT OF CORNER BENDING RADIUS ON THE LOCAL ELASTIC BUCKLING CAPACITY OF COLD-FORMED COMPRESSION MEMBERS

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Key Words: cold-formed, corner bending radius, elastic local buckling, warping, energy method.

Abstract

Due to a special producing procedure, cold-formed sections have curved corners. In the current design codes for cold-formed steel members, the presence of curved corners is ignored and its width is considered to be flat. The objective of this study is to show the effect of the corner bending radius on the local elastic buckling capacity of cold-formed sections in compression. For this purpose, two major cold-formed sections, namely, boxes (closed sections) and channels (open sections), have been studied. The Energy Method is used to predict the elastic buckling load of such sections by considering the torsional and warping properties of curved corners.

A STUDY ON THE EFFECTIVENESS OF SEISMIC FLOOR ISOLATION OF RIGID BLOCK TYPE EQUIPMENT USING SEISMIC FRAGILITY CURVES

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Key Words: block type equipment, seismic fragility, seismic floor isolation.

Abstract

The effectiveness of the floor isolation of block type rigid equipment is investigated using seismic fragility curves. A floor isolation system is proposed for the equipment. The equipment is considered in three different conditions referred to as; "equipment on the ground", "equipment on the building floor and without floor isolation" and "equipment on the building floor with seismic floor isolation". The seismic fragility curves are calculated for each case to evaluate the vulnerability of the equipment to rocking motion and toppling. Different aspect ratios are considered for the equipment. The results of the study on the rocking response of the equipment during earthquake show that floor isolation is effective in reduction of seismic fragility of the equipment on the floor, compared to the non-isolated equipment. Furthermore, the vulnerability of similar equipment increases with a reduction in aspect ratio.

MASS CHANGES DURING HYDROTHERMAL ALTERATION/MINERALIZATION IN MIDUK PORPHYRY COPPER DEPOSIT, SHAHR BABAK, KERMAN, IRAN

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Key Words: mass changes, alteration, porphyry copper, Miduk.

Abstract

The Miduk porphyry copper deposit is located in central-southern Iran. Mineralization is emplaced in Eocene volcanic rocks of andesite-basalt composition. Copper mineralization is accompanied by both potassic and phyllic alteration. The main mineralization is in the potassic alteration zone. In this paper, four alteration stages (potassic, transition, phyllic, and propylitic) have been studied, in terms of mass transfer and element mobility, during the hydrothermal process. In order to illustrate these changes quantitatively, isocon plots have been used. Isocon plots indicate that Si, Ti, Al, Ga are relatively immobile during alteration. In all stages

of hydrothermal alteration, volume changes are close to zero. In the potassic alteration zone, there is an obvious enrichment of K, Ba and a depletion of Na, Ca, Mg and Mn. In the transition alteration zone, Ca is added, Cu and K are depleted and Na and Mg are relatively unchanged. In the phyllic alteration zone, Na, K and Ba are depleted and Cu, Ca and Fe were enriched. Finally, in the propylitic alteration zone, Fe and Ba are depleted and Ca, Mg, Na and Cu are enriched.

ANALYSIS OF CHEMICAL AND PHYSICAL QUALITIES OF SURFACE TEHRAN ON BAYESIAN TIME SERIES MODELS

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Key Words: surface water quality, dynamic regression, Bayesian time series models.

Abstract

Given the global shortage of water, optimized water usage and pollution prevention are vital issues. In this study, a part of the surface water collection network in the North East and South of Tehran has been studied. Two stations, one in each area, have been chosen for water quality monitoring. The time epochs for monitoring are not equidistant and thus, a Bayesian approach has been employed. Results showed that a Bayesian dynamic regression model had a proper fit to the most collected data. Total Dissolved Solids (TDS) have been modeled as a function of Electric Conductivity (EC), and Dissolved Oxygen (DO) that of Temperature (T). The predictions were reliable. For acidity parameters, a second degree polynomial time series showed a better fit. These models can be reliably used for short period predictions.

EVALUATION OF FRICTIONAL CONTROLLER BEHAVIOR FOR SEISMIC PROTECTION OF VULNERABLE EQUIPMENT

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Key Words: seismic structural control, semi-active controle, variable friction dampers, equipment.

Abstract

Nowadays, semi-active control systems are used extensively because of their stability in structural response and high ability in control. Semi-active control, by use of variable friction dampers, in order to improve the loss of the energy characteristics of passive friction dampers, has received more attention in recent years. Seismic vibration can produce high acceleration and displacement and, finally, result in damage to vulnerable equipment. Semi-active control systems with a frictional controller and extremely small force, and by means of limiting input acceleration and device displacement, can truly control the response of the above equipment.

In this paper, the evaluation of the workability of a semi-active control technique, by means of variable friction dampers, to reduce the seismic response of equipment, and the effect of H_∞ control algorithms in systems accompanied by frictional controllers, is studied. This study demonstrates that the use of variable friction dampers with an adaptive property against various earthquake vibrations, and the requirement of low source energy, while, effectively, causing a decrease in the response of input acceleration to equipment, hold the device displacement to the floor with the least value. Results of this study, denoted by the use of frictional controllers and appropriate control algorithms that consider the effect of external disturbances and excitations, can help effectively to increase system ability to control equipment response.