The results show that the optimum percentage of adding lime is 3% of the total weight of expansive soil. However, the results indicate that the use of calcite quick lime shows a lower free swell, but a higher swelling pressure than the use of dolomite quick lime. It is also expressed that stabilization of expansive soils with hydrated lime has higher free swell and lower swelling pressure, in comparison to the stabilization with quick lime. The experimental results also show that adding lime in the optimum moisture of soil is the most effective method of stabilization of expansive soil.

Key Words: Expansive soil, stabilization, lime.

STRESS DISTRIBUTION AROUND ELLIPTICAL TUNNELS BY THE STEVENSON APPROACH

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 131-139, Research Note

- Received 16 January 2016; received in revised form 25 March 2016; accepted 8 June 2016.

Abstract

A powerful method for analysis of stress and deformation around underground structures is the analytical method. Among the analytical models the one that utilizes complex potential functions for the solution have the advantages of applicability and accuracy. Most of the governing solutions are applied to the circular shape tunnels or simple cross-section tunnels with one- or two-dimensional in-situ normal stresses conditions. For the elliptical shape tunnels, there are three methods of solution based on the complex potential analysis. They are Stevenson method, Mushkelishvilli method, and Series method for approximation of the complex potential functions. In the above models, the solutions are not unique in details, but all satisfy the boundary conditions on the tunnel surface and far field stress situation. The interested readers to these analytical methods' solutions to tunnels with different shapes can refer to the papers and books governing Timoshenko and Goodier, Savin, and Muskhelishvilli. In the above models, the Stevenson one is a powerful and robust model for analysis of stress and deformation on and around the elliptical tunnels. Therefore, in this research, the complex potential and conformal mapping functions of Stevenson model are applied to obtaining the stress around those openings. The analysis is a two-dimensional plane stress or plane strain conditions. Therefore, the solution can be used for stress concentration around long tunnels. The parameters of the governing complex potential functions are obtained by satisfying the boundary conditions and the problem hypothesis. Then by applying the sequence differentiations of the potential and conformal complex functions to the formulation the normal and shear stresses around the tunnel are calculated. The stress field, which is considered around tunnel, is uniaxial and biaxial compressive stresses. The results from three solved problems show the similarity between the calculated stresses on the tunnel surface with the Muskhelishvilli model. The solution can also be used for the situation of in-situ shear stress boundary condition around tunnel. It is suggested that the formulation be developed for the deformations on the surface and around the elliptic tunnels.

Key Words: Potential equations, mapping, conformal, elastic, harmonic, biharmonic.

THE INVESTIGATION OF THE EFFECTS OF LIME PROPERTIES AND THE MANNER OF COMBINATION ON STABILIZATION OF EXPANSIVE SOILS

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 141-146, Research Note

- Received 5 September 2015; received in revised form 12 March 2016; accepted 7 MAy 2016.

Abstract

Expansive soils are generally found in many parts of the world, especially in arid and semi-arid areas. Because of the ability of volumetric changes in response to seasonal fluctuations of moisture content, these soils are known as a harmful phenomenon in geotechnical engineering. Such soils swell when the moisture content is increased and shrink when the moisture content is decreased. Consequently, expansive soils cause detrimental damage to the structures founded on them. Clay soil can be stabilized by the addition of small percentages, by weight, of lime, thereby enhancing many of the engineering properties of the soil and producing an improved construction material.

In this study, in order to find an optimum percentage of the lime to stabilization of expansive soil, the expansive soil was stabilized with various amounts of dolomite quick lime. Next, in order to find the effective type of lime to reduce the swelling potential, the expansive soil was stabilized with two types of lime such as Dolomite lime and Calcite lime that are used as quick lime and hydrated lime. Finally, in the last step, the soil was stabilized with lime by different methods to find the best method of adding lime to the soil.

In this regard, there are a great number of studies on vibration analysis of single - span thin beams under moving loads. It is noteworthy to highlight that there is lack of research on the dynamic behavior of multi-span beams under moving inertial loads. Moreover, most of these studies neglect the inertia of the moving vehicle and consider the moving force approach. However, several investigations using moving mass approach highlighted the considerable contribution of load/structure inertial interaction for heavy masses moving at high speeds. In moving mass simulation framework, a solid mass is considered to slide on the base structure while remains directly in contact with the base structure. Therefore, the transverse acceleration of the moving object corresponds to that of the beam beneath the traveling load and the effects of vehicles flexibility are neglected. Moving oscillator model is composed of a mass supported by a spring-damper system in order to allow for the vehicle suspension system. Hence, moving oscillator can capture a wider range of possible structural behaviors with regard to the variation of vehicle stiffness. In this research, dynamic behavior of a multi-span continuous beam subjected to the excitation of an accelerated moving oscillator is studied to simulate vibration of a multi-span bridge acted upon by the accelerated movement of a vehicle. Euler-Bernoulli beam theory is employed as the governing equation for each span of the beam. The proposed solution is applicable to general beam fixity conditions. Moving oscillator model, as a reduced order model of a moving system, is of higher accuracy rather than old-fashioned methods of moving force and moving mass due to importing suspension system effects on the corresponding computational model. The solutions are verified and very close agreement is observed with published results via other methods in the asymptotic states of moving oscillator, where soft and rigid springs correspond to moving force and moving mass, respectively.

Key Words: Multi-span bridge, multi-span beam, moving oscillator, accelerated movement, dynamic response.

PROVIDING OPTIMAL MODEL FOR EVALUATING AND SELECTING CONTRACTORS IN CONSTRUCTION INDUSTRY FROM THE PERSPECTIVE OF HEALTH AND SAFETY AND ENVIRONMENT

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 121-129, Research Note

- Received 26 DEcember 2015; received in revised form 23 May 2016; accepted 19 June 2016.

Abstract

According to assignment of most activities to contracting companies and neglecting strict enforcement of safety, health, and environment in companies' contractions, rates of related indexes occupational accidents have been growing disturbingly, and thus increasing the importance of evaluating health, safety, and environment (HSE) performance of building industry contractors. The main purpose of this study is to provide an optimum pattern for evaluation and selection of construction industry contractors by HSE view. This research determines the main and secondary criteria which affected evaluating and selecting contractors by quantitative studies and special questionnaires and surveying perceptions. Sample size of 95% confidence level and margin of error of 5 percent by 252 peoples, including 4 Group executives and managers, employers, contracting companies and experts in health, safety and the environment were determined by the employer and contractor. KMO and Bartlett's test and confirmatory functional analysis (CFA) were used as testing methods. Validity of this questionnaire was obtained as 0.863 by Cranach's Alpha coefficient and reliability of questionnaire was confirmed. This article tries to determine intensity of these criteria in patterns of a model. Results show that human resources criteria are with the most effectiveness and planning criteria are of little effect. Suggested pattern can fulfill a continuous increase to a comprehensive pattern for evaluation and selection contractors. According to the proposed model, organizations can simply evaluate their contractors in terms of HSE performance. Contractors can also use this model to assess and identify their own weaknesses in the field of Health, Safety and Environment (HSE) of the model, which in turn "reduces accidents and improves awareness of contractors in the field of HSE Management System, and so, Standards HSE will be the scope of its activities.

Key Words: Evaluation, selection, contractors, construction industry, health, safety, environment.

DISPLACEMENT, ENERGY AND PLASTIC HINGE METHODS

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 99-110, Original Article

- Received 5 March 2016; received in revised form 7 May 2016; accepted 18 May 2016.

Abstract

Appropriate seismic design is based on real understanding of structural behavior. This requires precise perception of structural behavior during earthquakes which will be achieved by considering various codes' criteria. In other words, an ideal seismic design is a method which directly considers non-linear behavior and designs frames in a way that they experience their maximum capacity, it means plastic hinges occur in frames. The plastic hinge locations should be far from joints between beams and columns. In this way, local instability does not occur. Actually, more accurate recognition of structural behavior during earthquakes is the main issue of this research. For this purpose, regular steel- moment frames with medium ductility and height were designed based on resistance (force), direct displacement, energy and plastic hinge methods. All the models were developed in OpenSees computer program, and they were analyzed through non-linear time history. Three records, according to record magnitude, fault distance, and soil type, were used from Pacific Earthquake Engineering Research Center (PEER) (Kobe, Northridge, and Tabas). Ultimately, these records were coordinated based on Iranian Standard No. 2800. Then, frames were evaluated with various codes' criteria in order to represent a new formula for maximum roof allowed displacement (for the purpose of controlling structural behavior after design).This formula is based on maximum displacement that frames have experienced during different earthquake records in non-linear time history analysis. The result indicates that the new formula allows more displacement to structures in comparison to Iranian Standard No. 2800.

According to displacement time history of designed frames, at the beginning of the earthquake, the structures experienced severe impact and their nonlinear behavior was started. The transient displacement occurred when the first impact was applied to structure, and it was a displacement which happened along with the first plastic hinge occurrence. It makes sudden shock in displacement time history curve. With the passage of time, structures experienced variable displacements, and finally, a permanent displacement remained which is for the sake of nonlinear analyzing. Also, it can be inferred from the results that direct displacement and force methods present maximum and minimum base shears, respectively. In addition, in all frames, plastic hinge method provides maximum period value in comparison to other methods. It reveals that those frames which have been designed with plastic hinge method are more flexible. According to the results, the difference between direct displacement and energy methods period values is low, and period value of energy method is the minimum, as well.

Key Words: Medium steel moment frames, force method, direct displacement method, energy method, plastic hinge method, maximum roof allowed displacement.

ON THE EVALUATION OF DYNAMIC PERFORMANCE OF MULTI- SPAN EULER BERNOULLI BEAM INFLUENCED BY AN ACCELERATING MOVING OSCILLATOR

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 111-119, Original Article

- Received 1 Mrch 2016; received in revised form 15 May 2016; accepted 19 June 2016.

Abstract

Vibration of structures under moving loads has been extensively dealt with by numerous researchers. In particular, this problem is of importance to bridge engineers.

Abstract

In recent times, the use of cold formed steel (CFS) structures in housing industry has increased worldwide due to its great advantages, such as their light weight and high speed construction. In addition, the possibility of mass production and industrialization, quality control of construction and performance are other advantages of this type of structures. Although CFS walls are not new and have been used as non-structural components for many years, their application as the main load-bearing structural frames is relatively new, and as a result, appropriate guidelines that address the seismic design of CFS structures have not yet been fully developed. In addition, the lateral design of these systems is not adequately detailed in the available standards of practice. One of the currently-in-use lateral resistant systems for light steel buildings is steel shear walls sheathed by fiber cement boards (FCB). Fiber cement board sheathed panel lateral resistant system is already being used in housing industry though there are very few studies on the structural performance of these systems. In this paper, the seismic behavior of shear cold formed steel walls sheathed by fiber-cement board panels is investigated. For this purpose, finite element nonlinear analysis is employed using ANSYS software. The impact of some structural characteristics on the behavior of frames, including geometric imperfections and residual stresses are also studied. In addition, the ratios of height to width, studs thickness, fiber cement boards thickness, and studs spacing are investigated. Of particular interest are the specimens' maximum lateral load capacity and deformation behavior as well as a rational estimation of the seismic response modification factor. The study also looks at the failure modes of the system and investigates the main factors contributing to the ductile response of the CFS walls. A discussion on the calculated response factors in comparison to those prescribed in the relevant codes of practice is also presented.

Key Words: Shear wall, seismic behavior, cold-formed steel frame, seismic behavior, response modification factor, fiber cement board.

STRUCTURAL DAMAGE IDENTIFICATION BASED ON EXPANDED MODE SHAPES USING EXTREME LEARNING MACHINE

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 91-98, Original Article

- Received 23 January 2016; received in revised form 1 June 2016; accepted 21 June 2016.

Abstract

Much attention has been given to structural damage detection in recent decades in order to assess the reliability of structures during their service time. To detect damage in structures, one method, among different ones, is considered the most important i.e. the vibration-based methods. Because the modal parameters of structures like frequency and mode shape are so sensitive to structural properties like stiffness, it can therefore be used for detecting damage in structures.

This paper presents a novel approach for structural damage detection and estimation using expanded mode shapes and extreme learning machine (ELM). One of the problems in damage detection is the compatibility between the number of sensors and Degree of Freedoms (DOFs) in the finite element model of structures, in which the number of sensors, installed to structure, is usually less than the number of DOFs in the finite element model. So, the model reduction method should be used to match incomplete measured mode shapes or the measured mode shapes should be expanded to the dimension of the analytical mode shapes. In this study, the second option is adopted, using the improved reduction system (IRS) transformation matrix and used as input parameters to the ELM for damage identification. The proposed method uses the first two expanded mode shapes and natural frequencies as the input parameters and damage states as output to train the ELM model. Also, noise effect on the measured modal data has been investigated. The present method is applied to three examples consisting of a four span continuous beam, plane steel truss and four story plane frame. The obtained results demonstrated the accuracy and efficiency of the proposed method using incomplete modal data. Also, the results obtained indicate that the proposed method is a promising procedure for damage identification in spite of use of noisy modal data.

Key Words: Damage detection; expanded mode shape; extreme learning machine.

SEISMIC PERFORMANCE EVALUATION OF REGULAR STEEL MOMENT FRAME BUILDINGS BASED ON FORCE, DIRECT

strength of confined concrete under eccentric loading increased by increasing in the load eccentricity. By applying this coefficient to the model by considering the load eccentricity and calculating the load carrying capacity of specimens, the total error of specimens under eccentric loading decreases from 11 to 6 percent. This factors is determined using Genetic algorithms by optimizing the difference between experimental results and theoretical values. Comparison of results of tests with modified model, demonstrates that modified models in this study provide a better prediction for wrapped columns under concentric and eccentric loadings.

Key Words: Strengthening; eccentric load; concentric load; column; FRP confinement.

REPARABILITY ASSESSMENT OF STRUCTURES STRENGTHENED BY CFRP COMPOSITES

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 71-79, Original Article

- Received 27 September 2014; received in revised form 28 February 2015; accepted 29 April 2015.

Abstract
The scope of this study is the investigation of the rehabilitation of structures retrofitted by use of carbon-fb01brereinforced plastics (CFRPs) to achieve a safe, economic and practicable level of seismic damage. This paper investigates analytically the efficiency of the strengthening technique for improving the seismic behavior of damaged structures. 4 beam-column connections are tested under reversed cyclic load. The connections have none-seismic detailing of rebars, i.e., no transverse rebar and seismic stirrups are used in the joint core and beam and column critical end zones. The joints are damaged in different levels and then retrofitted by CFRP sheets. The strengthened joints are tested again to reach the ultimate drift capacity. Then, the tested joints, such as reference joint and retrofitted joints, are analyzed by Opensees nonlinear software. The results of joint analysis are compared with experimental behavior of specimens. The hysteresis curves of the modeled joints had a high level of accuracy in terms of stiffness degradation, moment carrying capacity, capacity degradation and energy dissipation. In the following, a multi-story/multi-bay moment-resisting frame is selected for assessment of seismic response of damaged frames. So, a step-by-step pushover analysis is done in order to find the plastic hinge positions and the level of plasticity on the moment resisting frame. The plastic hinges are developed on the beam ends and middle length of the frame beams. As the analysis progresses, the damaged frames are categorized in 7 levels according to performance levels defined by FEMA 356. The damaged Frames are retrofitted by CFRP sheets, considering the level of damage similar to the tested joints mentioned above. At the end, the retrofitted frames are subjected to El-Centro base acceleration. The root mean square parameter of roof displacement is also calculated for nonlinear time history response of frames. The retrofitting of the plastic hinges improved the RMS of the responses and compensated the lost capacity and stiffness. The results show that reparability level of frames retrofitted by CFRP sheets is equal to the level that the hinges on all of the beams are formed in collapse-preventing performance level. This level for specific frame investigated in this study is equal to 1.03% storey drift. Also, the results show that structures could be retrofitted by external bonding of FRP sheets to a limited level. If the damage level of structures is higher than this reparability level, other rehabilitation methods may be useful.

Key Words: Beam-column connection, rehabilitation, FRP sheets, nonlinear analysis, performance level.

STUDY OF SEISMIC BEHAVIOR OF COLD-FORMED STEEL FRAMES SHEATHED BY FIBER CEMENT BOARDS

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 81-90, Original Article

- Received 23 December 2015; received in revised form 28 May 2016; accepted 11 JUne 2016.

EFFECT OF TIME INTERVAL BETWEEN PEAK RESPONSES IN THE HORIZONTAL AND VERTICAL COMPONENTS OF GROUND MOTION ON THE SEISMIC BEHAVIOR OF RC BUILDING

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 47-59, Original Article

- Received 30 September 2015; received in revised form 23 May 2016; accepted 8 June 2016

Abstract

One of the main characteristics of the near-fault ground motions is low time interval between horizontal and vertical ground motion peaks, which can be coincidental when the source distance is less than 5 km. Generally, vertical peak ground motion occurs earlier than the horizontal one, thus has a significant effect on the response of the structures. In this paper, the effect of time interval between peak response in the horizontal & vertical components of ground motion is evaluated on the seismic behavior of RC Buildings. In this regard, regular RC buildings (in plan and elevation) with 4, 7, 10, 13, 16, and 20 stories and moment-resisting frame system in the ground type II are analyzed by OpenSees code. Then, the nonlinear static and dynamic analyses were done under the seven near-fault records, accordingly. These records were selected from the various parts with different magnitudes and frequency contents.

The effect of vertical component of ground motion as well as time interval between horizontal and vertical ground motion peaks has been explored on the seismic behavior of RC buildings including column axial forces, lateral displacement, base and story shear force, horizontal period as well as order and pattern of plastic hinge occurrence. Results showed that time interval between horizontal and vertical ground motion peaks has considerable effect on the columns axial force; this effect is higher on the internal columns rather than perimeter columns. It can be explained that the effect of time interval between horizontal and vertical ground motion peaks on low-rise buildings is higher than those of medium- and high-rise buildings. The effect of vertical component of ground motion on the column axial force variation tends to decrease with the increase of time interval, which, nevertheless, has small effects on the lateral displacement and story shear.

Key Words: Vertical component of ground motion, time interval, axial force, RC building.

MODIFIED STRESS-STRAIN MODELS OF CONCRETE CONFINED WITH FRP UNDER CONCENTRIC AND ECCENTRIC LOADINGS

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 61-69, Original Article

- Received 21 November 2015; received in revised form 23 May 2016; accepted 11 June 2016.

Abstract

Wrapping reinforced concrete columns with composite materials is among the new methods of repairing and strengthening at the moment. There are several analytical relationships for load capacity prediction of strengthened columns with this method under compressive load in the literature, but, columns that are on the border of buildings are usually subjected to combined axial-flexural loading in practice. According to strain gradient in the columns under eccentric loading, the FRP confinement effect is different and changing with the load eccentricity. A few relationships for load capacity calculation of strengthened columns under eccentric loading are presented, some models in the literature are in contradiction with each other. This paper presents constant factor, FRP strain efficiency factor in the model, proposed by Lam and Teng, which is modified for specimens under centric loading, varying according to the type of FRP. It has been shown in this study that the constant factor is not only dependent on FRP type, but it also depends on the FRP elastic modulus to unconfined concrete compressive strength ratio. With this modification, total error value of 76 specimens under centric loading will decrease from 10.63 to 9.5 percent.Then, correction factor is analyzed to apply the load eccentricity to the existing models and compare them with available experimental results. This correction factor shows that compressive

Abstract

Seismic evaluation of concrete dams due to some considerations is very important. The effects of fluid-structure-foundation interaction, nonlinear behavior of dam material due to crack, and earthquake loading are some of these considerations and should be considered in modeling and analysis of the system.

The nonlinear seismic response of concrete gravity dams is presented when the effect of the dam-reservoir interaction is included using Lagrangian-Lagrangian approach of the finite element method. Nonlinear fracture mechanics, based on the smeared crack concepts, is used to study the cracking profile and response of the dam. In this study, a comparative study between the coaxial rotating crack model and orthogonal multi-fixed smeared crack models is carried out. Based on the presented formulation, Pine Flat concrete gravity dam is analyzed and its crest response and stresses within the dam body are founded. Bosak's time integration and corrected Newton-Raphson method are used for solving nonlinear dynamic equations.

Results show that the two crack approaches have negligible difference in terms of the number of cracked gauss points and the crack profile. Tensile principal stresses based on fixed crack concept are greater than those of the rotating crack concept, but for compressive principal stresses the results are vice versa. The differences are due to unloading-reloading path and shear retention factor, but crack propagating path remains the same. Displacements of dam crest in nonlinear cases are greater than those of linear ones and show the same result in two crack models. This phenomenon depended on internal damping of system in both linear and nonlinear cases. Permanent displacement of dam crest based on fixed crack concept is greater than that of the rotating crack concept, and this phenomenon depends on cracking intensity of dam body.

Results show that the fixed crack concept have better convergence than that of the rotating crack concept and the number of iterations in the time steps are low.

Key Words: Concrete gravity dam; nonlinear dynamic analysis; rotating smeared crack; non-rotating multidirectional smeared crack.

IDENTIFICATION OF MULTI DEGREE OF FREEDOM SYSTEMS SUBJECTED TO AMBIENT NONSTATIONARY VIBRATION

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 37-45, Original Article

- Received 27 July 2015; received in revised form 11 May 2016; accepted 28 May 2016.

Abstract

Different approaches are presented for systems identification in the literature. Benchmark problems for the system identification and damage detection of civil engineering structures are established, and different methods are illustrated by international participants. In this paper, the dynamic characteristics of a three story shear frame, subjected to nonstationary white noise excitation are identified by the use of Natural Excitation Technique (NExT), Wavelet and Hilbert transforms. Because the ambient vibration imposed on the system is nonstationary, the response acceleration of the system is also nonstationary. Therefore, a method is used to turn nonstationary signals into stationary ones. Natural Excitation Technique is applied to extract free vibration responses of the system from the available stationary signals.

Continuous Wavelet Transform (CWT) of free vibration decay decomposes the signals to a set of sub-signals corresponding to natural vibration modes. The mother wavelet used is modified complex morlet wavelet. Analytical complex signals are extracted from the mentioned sub-signals using Hilbert Transform. The Hilbert transform is applied to each modal response to obtain the instantaneous phase angle and amplitude as functions of time t. Then, a linear least-square fit algorithm is used to fit the instantaneous phase angle and the log of instantaneous amplitude. From the slopes of these linear least-square lines, the natural frequency and damping ratio of each mode can be identified. Based on a single measurement of the free vibration time history at a proper location of the MDOF linear system, all natural frequencies and damping ratios can be identified. When the responses at all degrees of freedom are measured, the complete system dynamic characteristics can all be identified, including the mode shapes, damping and stiffness matrices. The applications of the proposed method are illustrated in detail using a linear three degrees of freedom shear frame. Simulation results show that the accuracy of the method in identifying the system characteristics is remarkable.

Key Words: System identification, natural excitation technique, continuous wavelet transform, hilbert transform, nonstationary white noise.

the errors, the process of stiffening went on for up to four vertical and horizontal stiffeners, and, finally, the corresponding equations for the percentage of increase in strength and stiffness of the panels were obtained. Consequently, a domain of the number of stiffeners was introduced, and the addition of more stiffeners to the upper boundary of the proposed domain did not have considerable effect on the increase in strength and stiffness. Ultimately, the validity of the proposed equations was examined by some re-modeling within that a related domain was introduced, and the results confirmed the proposed equations in a very favorable manner.

Key Words: Stiffened steel plate shear wall, stiffness, shear capacity.

INDEPENDENT AND INTERACTION EFFECTS OF CONGESTION PRICING AND TRANSIT SYSTEM IMPROVEMENT POLICIES ON CAR USE FOR WORK TRIPS TO TEHRAN EVEN-ODD ZONE

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 13-23, Original Article

- Received 1 July 2015; accepted 19 June 2016.

Abstract

Today, transportation demand management (TDM) policy tools are accepted as practical solutions for decreasing the costs of congestion in urban regions, and more efficient using of transport infrastructures. This paper investigates the role of a "time-of-day congestion pricing scheme" as a pull TDM policy and two push TDM policies including "bus travel time reduction" and "bus access time reduction" in users' car use behavior. The main goal of this research is to estimate the impacts of these policy-tools on the probability of choosing car at morning peak, when they are applied separately or simultaneously.

The analysis is based on the results of a stated preferences survey developed through the experimental design approach and was completed by 231 users, who travel into Tehran's even-odd zone for work by car. The advantage of data gathering in even-odd zone was that these commuters were familiar with the boundaries of pricing area and so, they could make a more realistic decision (for example, decision about choosing park-and-ride mode). For considering a time-of-day congestion pricing policy, we introduced a cordon pricing scheme from 6:30 AM with a discount on entering after peak period (in this case study, between 6:30 AM to 9 AM). Like other policies, the discount policy has three levels containing 50%, 25% and 0% of peak period tolls.

The independent and interaction effects of these policies are assessed by developing a two-level mode choice nested logit model and estimating marginal effects. This model has 8 alternatives, three of which are related to driving a car: drive before 6:30, drive between 6:30 and 9, and drive after 9 AM. Results show that cordon pricing scheme from 6:30 AM has the largest effect and could decrease share of drive between 6:30 and 9 AM by 0.408. Congestion charging scheme at 6:30-9 AM and bus access time reduction, are also the most effective policy-tools with a 0.49 decrease in car share when applied simultaneously.

Key Words: Congestion pricing, bus system enhancement, mode choice, stated preference experiment.

CONCRETE GRAVITY DAMS RESPONSE CONSIDERING ROTATING AND FIXED MULTIDIRECTIONAL SMEARED CRACK

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 25-35, Original Article

- Received 1 July 2015; received in revised form 23 May 2016; accepted 8 June 2016.

Abstracts of Papers in English

EFFECT OF DIFFERENT CONFIGURATIONS OF STIFFENERS ON THE SHEAR CAPACITY AND STIFFNESS OF STIFFENED STEEL PLATE SHEAR WALLS

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Sharif Civil Engineering Journal
Volume 33, Issue 4.2, Page 3-12, Original Article

- Received 27 September 2014; received in revised form 28 February 2015; accepted 29 April 2015.

Abstract

The use of steel plate shear walls (SPSW), as an efficient lateral seismic resistant system for buildings, has recently received much attention, both in new and rehabilitated structures of concrete and steel. Shear panels play an important role in improving the seismic behavior of structures. They generally occur as unstiffened or stiffened steel plate shear walls. This paper focuses on stiffened steel plate shear walls and endeavors to investigate the shear behavior of this kind of panel as there are many theoretical and experimental studies on these systems without stiffeners, for which different analytical methods have been presented, and are mostly applicable to very thin steel plate shear walls, and also, as there is no simple mathematical equation which correlates the amount of increase in shear strength and stiffness of stiffened panels with the number of stiffeners. In order to achieve this purpose, the shear capacity (strength) and stiffness of stiffened shear wall panels have been studied with the aid of a series of finite element analyses under different stiffener configurations, including horizontal and vertical stiffeners and a combination of both, using ANSYS. The aim of the present numerical research is to study the effect of stiffening upon the ultimate shear strength and stiffness of stiffened shear panels; finally, to find a mathematical relationship (if any) between the increase of strength and stiffness of the wall and the number of vertical and horizontal stiffeners used. At the beginning, the unstiffened panel was modeled, by comparing the results of the analysis with the related classical equations and experimental tests. Having calibrated