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Abstract

Road safety for children is not at an acceptable level in developing countries; and the age group of 5-15 years is at the highest risk level. It is clear that almost all of which are students in those countries. Considering a large population of students in our country, the discussion of vehicle accidents with students and the safety of the environment surrounding schools require more attention. This study aims to investigate the effect of traffic calming on student crashes surrounding schools of Boroujerd. In order to collect data, interviewing and viewing tools were used. In this regard, 116 primary and secondary school information were collected including school type, educational level, age group, gender, functional hierarchy, land use, accident type and student accident history in the last 5 years and traffic calming equipment surrounding schools. Data analysis was done by descriptive and inferential method. The findings showed that 73% of student accidents in the school districts occurred in the absence of traffic calming equipment and 63% of schools with no accident history of students had traffic calming equipment. It was also found that 62% of accidents occurred in residential areas, 47% of the accidents occurred in 2^{nd} grade passageways (major distributor) and 100% of accidents occurred around public schools. The study on the relationship between student accidents and traffic calming showed that there is a significant relationship between student accidents surrounding public schools, in residential areas, 2^{nd} grade passageways (major distributor) and student accident injuries along with the traffic calming. However, there was no significant relationship between student accidents in terms of educational level, age group and gender with traffic calming. The results of the research indicate that there is a risk of accidents and damage due to high speed of vehicle, high population density and poor economic status. Therefore, traffic calming measures in these places should be considered more than other areas.

Key Words: Student, school vicinity, safety, accident, traffic calming.

loading on the body of spillway concrete structure during a flood complicates the interaction analysis of the structure and the fluid. By using numerical methods in computational fluid dynamics and structural analysis, we will be able to predict the behavior of structure and fluid hydrodynamics parameters. In model's fluid domain, choosing the type of Navier—Stokes equations proportional to the efficient RANS mathematical model of turbulence, is very sensitive. Mainly one equation turbulence models such as the Spalart-Allmaras or two-equation models, such as K-Epsilon or K-Omega, are based on Boussinesq hypothesis. Boussinesq hypothesis explains how to estimate the components of the fluid stress tensor for the above-mentioned turbulence equations. This assumption, by simplifying the computation process, only a in some parts of the fluid domain, analyzes the turbulence as anisotropic.

Key Words: Computational fluid dynamics, fluid-structure interaction, morning glory spillway, structural analysis.

ESTIMATED ULTIMATE CAPACITY OF RBS CONNECTIONS UNDER MONOTONIC AND CYCLIC LOAD USING DUCTILE FRACTURE MECHANISM

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Abstract
The basis of the modern design of earthquake resistant structures is based on the structural ductility for absorption of earthquake energy and stability in large-scale displacement. Although metal materials are highly ductile, the Northridge earthquake showed that moment connections have a certain rotational capacity under cyclic load, and severe earthquakes can lead to failure in the area with low ductility. Therefore, in order to determine the level of actual performance of structures under earthquake, such as the life safety or Collapse Prevention, it is necessary to carry out more serious studies to determine the final cyclic capacity of connections. On the other hand, after the collapse of the Alfred P. Murrah Federal building, a truck explosion in 1995, as well as the collapse of the World Trade Towers caused by the 2001 airplane collapse;Determination of final capacity or failure of fittings under uniform load; to investigate the structural behavior before the destruction or complete destruction began. Since most of the tests carried out on the connections have not been completed due to the limitations of the laboratory facilities and have not been performed until the failure phase of the connection; hence, it does not determine the final capacity of the connection. Mathematical studies are also in the early stages due to the lack of reliable failure mechanism to determine the time and how to start and spread the failure under monotonic and cyclic loading. In this research,it has been attempted to be evaluated the final capacity of the RBS connections under the monotonic and cyclic load . Also, the place of the start of defect in this type of connection is evaluated. In this regard, the final capacity of the reduced-sectional beam (RBS) connections under uniform loading was determined using a column-removing scenario with the SMCS model and the theory of growth and expansion of void under uniform load. Then, the final capacity of the reduced-beam section (RBS) connections under cyclic loading (SAC) was obtained by using the Cyclic Void Growth Model (CVGM) and compared with the proposed final capacity of FEMA350 for RBS connection. The results of this study show that the cyclic rotational capacity of the RBS connections provided in FEMA350 is far more than actual. Also, the results show that the rotational capacity of the RBS connection under monotonic load is almost twice the amount given in FEMA350.

Key Words: Ultimate capacity, monotonic load, cyclic load,reduced beam section (RBS), void growth model.

THE EFFECT OF TRAFFIC CALMING IN THE VICINITY OF SCHOOLS ON STUDENTS ACCIDENTS

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Abstract

Piers and abutments cause local contraction in the rivers. As a result of the contraction, the water level increases in the upstream section of the bridge named as afflux. Afflux is one of the key concerns in the design of a bridge construction and the afflux estimation is important when the specific regions in the upstream of the bridge is to be protected against the flood. Hence, estimation of the afflux is required for river training of the upstream sections, before bridge construction. In this research 54 experiments were conducted to investigate the effects of different parameters such as the pier angle with respect to vertical, the Froude number and the contraction ratio on afflux. Design expert software is used to design the experiments and to analyze the results. According to the results, for a downstream inclined and laterally inclined piers, the afflux increased. However, the afflux decreases due to an upstream inclined pier. Also, the effect of inclination angle on the afflux is smaller for inclined piers towards upstream than inclined pier to the downstream or laterally inclined piers. By increasing the pier angle from zero to 24 degrees, toward channel side walls and toward downstream the afflux increases by 20 and 15 percent, respectively. While in the same situation by increasing the pier angle from zero to 24 degrees toward upstream, the afflux decreases by about 5 percent. The higher affluxes were observed in larger Froude numbers and contraction ratios. The analysis showed that the Froude number and contraction ratio have more effects on the afflux as compare to other parameters. Finally, appropriate equations are presented to estimate the afflux.

Key Words: Afflux, inclined pier, design expert software, froude number, contraction ratio.

INVESTIGATING THE DYNAMIC INTERACTION OF MORNING GLORY SPILLWAY WITH RESERVOIR WATER USING THE COUPLED FINITE ELEMENT-FINITE VOLUME METHOD

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Abstract

In this research, the behavior of the morning glory crest and throat were investigated in the event of flood. Spillway structure and dam reservoir fluid were respectively simulated using the finite element method and finite volume method in ANSYS software. The morning glory structure's behavior was performed in three scenarios: a) the static analysis scenario of the dam empty reservoir, b) the static analysis scenario of the full reservoir while there is no flow over the spillway crest, and c) the dynamic analysis scenario of structure-fluid interaction in two parts: 1- starting of the flood flow on the morning glory spillway, and 2- the steady state flood flow on the morning glory spillway. The concrete structure analysis was linearly done in all three scenarios. Based on the results, the most critical condition for the structure in terms of maximum tensile stress was 5.3 MPa in the first part of the third scenario. The maximum compressive stress was 12.3 MPa in the second part of the third scenario. Spillways are one of the most important and vital structures in the life of a dam. The efficiency and proper functioning of such structures requires a precise and responsible design. The morning glory spillways have a great deal of importance due to the standing structure inside the dam reservoir. The weight and hydrodynamic

been mixed with mortar and aggregate. Structural behavior of this mixture induces strain hardening behavior under uniaxial tension. This behavior is the most important property of high performance material. Mechanical properties of this material, such as bending strength, ductility, toughness and crack width are more desirable than those of conventional fiber reinforced concrete. Moreover, using this material induces no constructional problem and can be used to repair, retrofit and construction of earthquake resistant buildings with high strength and ductility. In this research, with respect to advantage of SIMCON material, retrofitting of beam-column connection of RC frame with SIMCON material is evaluated. Verification is carried out comparing experimental and numerical model results for beam-column connection using OPENSEES software. Two specimens from an experimental study have been selected for verification. The hysteretic behavior of experimental and numerical results shows good agreement in the form of the maximum force and dissipated energy for the two specimens. Three 2D frames with 4, 7 and 10 stories have been developed for the study. These frames have non-seismic details in their joints. Effect of retrofitted joints in general behavior of retrofitted frames is evaluated and compared with non-retrofitted frames using nonlinear static (pushover) analysis. Results from pushover analysis show increase of lateral strength, ductility and ultimate displacement of the retrofitted frame compared to those of non-retrofitted frames. Evaluation of results shows that the ductility of retrofitted frames has been increased by 39% to 48% compared to similar non-retrofitted frames. Moreover, lateral strength for retrofitted frames has been increased by 50% to 57% compared to similar non-retrofitted frames. Assessment of nonlinear time history results obtained by applying seven earthquake records shows that the average maximum roof displacement for retrofitted frames has been decreased by 14% to 21% compared to the similar non-retrofitted frames. Furthermore, the average maximum base shear for retrofitted frames has been increased by 25% to 30% compared to similar non-retrofitted frames. The average maximum story drift ratio for retrofitted frames has been decreased by 42% to 47% compared to similar non-retrofitted frames.

Key Words: SIMCON layers, high performance fiber reinforced cementitious composite (HPFRCC), strain hardening, moment RC Frame, nonlinear analysis.

IDENTIFICATION OF DAMAGE IN RIGID CONNECTIONS OF STEEL MOMENT FRAMES IN HEIGHT AND PLAN OF THE STRUCTURES USING MODIFIED MODAL CURVATURE METHOD

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Abstract

Damage detection of the structures is one of the most important parts of structural health monitoring. Dynamic characteristics such as natural frequencies, mode shapes and damping are inherent parameters of structures which change through local damages. In This paper a new method for damage detection of rigid connections in moment resisting frames at the height and in the plan of the structure is presented. This method is based on the mode shape curvature. The presented procedure is a two-step procedure. At first, the damage level is localized using modal shape curvature of the columns and then the exact place of the damaged connection is determined on the plan using modal shape curvature of the beam. In this essay a new method is being used to draw mode shape curvature at the beginning and the end of members. Detecting the damage at boundary areas becomes possible using this method. The new method is used to normalize the mode shape curvature differences data to localize the damaged connections accurately. This procedure is studied on a seven story three bay steel moment frame with real measurements and in different damage scenarios. The results of this study indicate that the proposed method can identify the location of damage in the connections, especially at the beginning and end of the members with acceptable accuracy.

Key Words: Damage detection, rigid connections, modified modal curvature method, damage in height and plan, moment frames.

EXPERIMENTAL INVESTIGATION ON AFFLUX DUE TO INCLINED CIRCULAR BRIDGE PIER

sheets. The analytical results also show good agreement with the experimental results. The main difference between the analytical and experimental results is due to the simulation of pinching effect of the experimental results.

Key Words: Strengthening, reinforced concrete column to foundation connection, stiffness, energy dissipation. GFRP.

SEISMIC RESPONSE OF BASE ISOLATED STRUCTURES WITH INSUFFICIENT SEISMIC GAPS

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Abstract

Increasing number of seismically isolated structures mostly in seismic-prone regions of the world has raised a concern on seismic performance of these structures in severe earthquake ground motions. On one hand, base-isolated buildings should have a clear certain gap with adjacent structures to avoid pounding; otherwise developed seismic force and displacement demands during impact with neighboring buildings or surrounding moat walls may be far beyond the capacity of the superstructure. In this case, the advantage of using base-isolation technology over traditional seismic design may be totally lost. On the other hand, considering the high cost of lands and other urban limitations do not allow for large seismic gaps to completely eliminate the risk of pounding. Moreover, isolation hardwares should remain stable under vertical loads at their maximum horizontal displacement demand under maximum considered earthquake motion. This results in expensive isolation devices that may prevent the use of isolation technology for a wide range of residential constructions. Additionally, the structural performance level of base-isolated buildings has a sharp change from immediate occupancy for moderate seismic hazard levels to collapse prevention for the large ones. Consequently, structural elements of the superstructure usually do not experience damage-control performance levels. Aforementioned performance objectives may not be compliant with the performance goals considered for residential buildings with normal importance. This study aims to evaluate seismic performance of base-isolated buildings with insufficient seismic gaps that do not conform to minimum codified gap requirements. A wide range of isolated and fixed-base elastic superstructures has been subjected to analytical near field pulse-type motions to evaluate seismic demands in the superstructure during impact with retaining walls. Different values for stiffness of moat walls has been considered with a stereomechanical impact model. The results of the parametric study show that the developed seismic demands in the superstructure depends on the pulse duration, gap size and the ratio of the isolated period to the fixed-base period as well as the moat wall stiffness. As a conclusion, this study shows that by using available gap sizes and utilizing lower cost isolation devices with a smaller displacement capacity compared with the current code-based design requirements, a more economical performance-based seismic design for base-isolated structures is achievable adopting a more gradual transition from immediate occupancy performance level to the collapse prevention one.

Key Words: Base-isolation, gap size, pounding, seismic performance, near-field ground motion.

EVALUATION OF SEISMIC BEHAVIOR OF RETROFITTED REINFORCED CONCRETE FRAMES BY SIMCON MATERIAL

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Abstract

SIMCON is a novel high performance material. This material has a high volume fraction of fiber, which has

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Abstract

Universities and research institutes typically consider short-term and long-term construction projects according to their strategic plan to expand their education and research programs. Iranian general conditions of construction contracts should be attached to such construction projects' contracts. Conflict of interests among contracting parties may arise in projects which may put success of the project on risk. The contractor may act on its own interest instead of the owner interest. General conditions of construction contracts are central in mitigating such conflicts and in improving the success of the project. However, there may exist some shortfalls in general conditions of construction contracts. This research explores and addresses shortfalls in general conditions of construction contracts of Iran focusing on construction projects conducted at universities and research institutes. Two hypotheses are proposed to evaluate the importance of revising different chapters of the general conditions of contracts and to consider their possible shortfalls. A survey is made by the use of a questionnaire. Construction practitioners from seventy universities and research institutes are involved in the research. The practitioners are senior personnel coming from owners, consultants and contractors organizations. One way analysis of variance, non-parametric Kruskal Wallis and the least significant difference methods are adopted to analyze the survey data in SPSS. The results in most cases indicate no meaningful difference based on the importance of need for revising different chapters of general conditions of construction contracts. The results also in majority of cases show no meaningful difference among owners, consultants and contractors perceptions about the importance of need for revising different chapters of such general conditions of contracts. It can be concluded that the revision's committee should put the same priority in revising different chapters of general conditions of construction contracts. Based on the perception of the research participants recommendations for improvement of general conditions of construction contracts are provided. This research would be relevant to those interested in revising the general conditions of construction contracts by providing insights for further improvement.

Key Words: General conditions of contract, research and education institutes, shortfalls.

STRENGTHENING OF CIRCULAR REINFORCED CONCRETE COLUMNS TO FOUNDATION CONNECTION WITH GFRP BARS AND CFRP SHEETS

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Abstract

Bridges play a significant role in developing the roads and accelerating the serviceability in normal and emergency situations. The corrosion problem of steel reinforcing bars in reinforced concrete columns of bridges in humid environments results in the early deterioration of these structures. Therefore, it is vital to use the efficient and cost-effective strengthening methods to increase the serviceability of these structures in critical situations. In this study, the strengthening of circular reinforced concrete column to foundation connections with fiber reinforced polymers is investigated. In the experimental part of the study, four specimens of column-foundation connections were cast and tested. One specimen was used as the control specimen without strengthening. Two other specimens were strengthened with GFRP reinforcing bars of different sizes. The fourth specimen was strengthened with both of GFRP reinforcing bars and CFRP sheets. These specimens were under constant axial compressive load and cyclic lateral displacement, simultaneously. Initial stiffness, energy dissipation capacity, lateral load capacity and ductility of the specimens are studied. In order to investigate the ability of the ABAQUS software, the experimental specimens were simulated in the aforementioned software. Test results show that the amount of lateral load capacity, initial stiffness, energy dissipation capacity and ductility increase significantly due to flexural strengthening of circular reinforced concrete column to foundation connections with GFRP bars. The highest increase in the amount of the aforementioned parameters is observed in the specimen strengthened with GFRP bars and CFRP

number, and conflict distances in per day was assessed and an effective dependency in the same direction was perceived. The result of real case modelling demonstrates that the collisions of executive resource workspaces are occurred approximately in a quarter of project days with the average conflict distances of 2.3 meter.

Key Words: 5D CAD model, construction resource, spatial conflict, workspace management.

POST-TREATMENT OF LEACHATE BY MICROWAVE-FENTON PROCESS USING OFAT ANALYSIS METHOD

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Abstract

Industrial and economic development along with changes in lifestyle over recent decades in most countries has resulted in considerable growth of different waste. Since biodegradable organic materials constitute approximately 60% of the total municipal solid waste in developing countries, leachate treatment is considered as a big concern for solid waste management in these areas. Application of biological processes is one of common method in leachate treatment. However, due to presence of refractory pollutants, biological process alone cannot treat leachate on its own. In order to enhance the quality of leachate to the discharge standards, post treatment of biologically treated leachate is essential. One appropriate solution for complementary treatment of leachate and removal of refractory materials is the application of advanced oxidation processes. The Fenton process is one of homogenous advanced oxidation processes has been applied for leachate treatment. However, this method is time-consuming and expensive. In order to improve the performance and reagent utilization efficiency, in this paper microwave enhanced Fenton process was utilized for post-treatment of composting leachate. Batch laboratory scaled experiments were employed on effluent of leachate treatment plant of a composting factory in Iran. Initial experiments were conducted and then the effects of variables were determined separately by one factor at a time (OFAT) method. The effects of factors such as pH, ratio of concentration of H_2O_2 to initial COD, ratio of concentration of H_2O_2 to Fe^{2+}, and Microwave irradiation power on the microwave enhanced Fenton process efficiency were investigated. According to obtained results the maximum removal efficiency of Microwave enhanced Fenton process was obtained at pH=3, ratio of H2O2 concentration to initial COD equals to 3.75, ratio of H_2O_2 concentration to Fe^{2+} concentration of 3, and Microwave irradiation power of 170W. The experimental results indicated that, under this optimum conditions, the removal of COD, total nitrogen, color, and turbidity were 72%, 70%, 75% and 88% respectively. Results of this research addresses that, applied process is unable to reduce organic load of the leachate in a way that it could be discharge in receiving environment. However, the ratio of BOD_5/COD was elevated from 0.01 to 0.25, representing substantial improvement in biodegradability. By so doing, a common biological process such as activated sludge could be hopefully utilized to reduce remaining organic load to the limits set by the standard.

Key Words: Leachate, advanced oxidation, fenton, microwave.

SHORTFALLS OF GENERAL CONDITIONS OF CONSTRUCTION CONTRACT AT UNIVERSITIES AND RESEARCH INSTITUTES PROJECTS OF IRAN

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Abstract

In liquefaction occurrence, shear strength of loose cohesionless deposits of saturated soil is considerably reduced or even is lost when subjected to dynamic or seismic loads. The earthquake-induced liquefaction can cause significant damage to existing facilities and structures.It is, therefore, of prime importance to deeply understand the liquefaction mechanism and the related and affecting parameters on this phenomenon. In the current study, using a semi- automated shaking table, the effect of the relative density and the percentage of non-plastic fine content of soil material on the liquefaction potential and the settlement of saturated sand layers were investigated. Acceleration of the shaking table in all tests was adopted to be constant and equal to 0.3g having a frequency of approximately 4.7 Hz. In contrast to many other researchers conducted in recent years, loose and very loose sands are considered for experimental studies. Further, shaking table studies conducted here on these materials are considered as relatively large scale tests which notably differ from those conducted mostly by common triaxial tests in the past. The results obtained showed that the higher the relative density, the lesser is the pore water pressure even if the shaking level is high and that the probability of liquefaction is reduced to the lowest level. In addition, the surface settlement of soil layer is significantly reduced. It was also observed that, despite the existing challenges and even opposing point of views among researchers, an increase in the percent of non-plastic fine content in the soil material would lead to a reduction in settlement of soil layer and, ironically, to an increase in pore water pressure. Other observations on the experiments conducted in this research verified that the time during which soil remains in liquefied state is reduced if and/or percentage of fine content of soil material is high.

Key Words: Liquefaction, saturated sand, non-plastic fines, relative density, shaking table.

WORKSPACE PLANNING OF CONSTRUCTION RESOURCE IN MICRO-LEVEL PROJECTS BY BUILDING INFORMATION MODELING (BIM)

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Abstract

Construction resources in addition to identifying project's time and cost, sets up a unique spatial requirement in the project life cycle. The dynamic nature of construction resources leads to confined spatial conditions along with the project progresses. Incomprehension of the workspace condition and spatial-time conflicts lead to a considerable decrease in productivity and efficiency of working teams. Reduced efficiency of contractors alters temporal specifications such as critical path, duration and sequence of activities as well as budget planning of the entire project. Building Information Modeling (BIM) make a better understanding rather than activity-based scheduling techniques by covering the simultaneous cost, time and spatial information of activities.

The Five-Dimensional Computer-Aided Design (5D CAD) model in this research, quantifies the number and the distance of spatial interference and also highlights space critical level of construction components and its corresponding resources on a daily basis. To conduct the research, an innovative three-phased modelling methodology was deigned: preparation of basis model, definition and allocation of workspaces, and finally simulation and detection of spatiotemporal conflicts. This investigation has started the initial stage of preparation information model through the generation and linking of two Product and Work Breakdown structures (PBS and WBS). The cost and Time required for creation of 5D CAD models are calculated by resource analysis and work-group efficiency rate. In proposed model, work execution space is simulated by BIM accessible software on a daily level and time-space conflicts are recorded automatically.

This research by presentation of a novel methodology linked the graphical and non-graphical data together and made visual 5D workspace planning of construction resource and their interaction. The main purpose of this system is to contribute promoting planners' understanding about the potential spatial conflicts based on the overlapping duration and simulation of activities workspace according to the real situation.

Proposed methodology was evaluated by implementing it in a real case (Micro-level project) and analyzing data obtained from it. Finally, the correlation coefficient between the variable such as number of activities, clashes

eters may be the values of frequencies and modal shapes of the real damaged structure and its related analytical model. Extensive results obtained from analysis of different models with various dispersed damages which were so small or very influenced in severity, shown that the proposed methodology has able to detect three levels of the structural health monitoring stages, accurately and more precisely. These three levels are as follows: (1) detection that the considered structure is healthy or damaged, (2) detection of damage locations (along whole or part of the members of the considered structure), (3) detection of the severity of the damaged member, which may be so small or so intense.

Key Words: Model updating, damage detection, constrained optimization, dual steel structure, newton's algorithm, 2D frame, finite element model.

THE EXPERIMENTAL STUDY OF THE MICROPILE EFFECT ON LIQUEFACTION POTENTIAL OF ANZALI SATURATED SAND

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Abstract
In this experimental research, the effect of the number of micropiles, the relative density of soil, and dry stone surcharge on the liquefaction potential of Anzali sand was studied by using shaking table apparatus with the rigid transparent container. The inner sides of the rigid transparent box, installed on the shaking table, were covered with the sheets of foams to reduce generation and reflection of body waves from the rigid sides. Two pore pressure transformers (PPT) were used to monitor the pore water pressure variations. For model preparation, the moist tamping method was used. The grouting operation for the construction of micropiles was performed using a grouting device under the injection pressure of 0.1 bar with a water-cement ratio of 0.5. Three different arrangements of micropiles were used. The equivalent diameter and the length of micropiles were 0.9 and 23 cm, respectively. After 7 days of curing, the model was saturated from the bottom of the tank with a low hydraulic gradient. All models were shaken under a harmonic sinusoidal load with the frequency, the displacement amplitude, and the duration of 3Hz, 0.9 cm and 9.5 seconds, respectively. It was observed by increasing the relative density of the sand, due to reducing of void ratio, the values of excess pore water pressure ratio (r_u) were decreased, and the required cycles for reaching the $r_{u,max}$ (N_{peak}) were increased. The obtained results showed that the liquefaction potential of saturated sand was significantly decreased by installing two and four micropiles into the soil model. On the other hand, one micropile had a negligible effect on reducing of the liquefaction potential. It can be explained by forming the grout-sand zone around the micropiles and also the localized compaction in the soil after grouting, the rate of pore water pressure generation is limited. A dry stone surcharge with the stress of 1.2 kPa was placed on the surface of saturated sand, and due to the significant increase in effective stress, the liquefaction potential was reduced significantly, leading to the increase of N_{peak}. Based on the obtained results, the upper and lower bounds were proposed to predict the values of r_u in pure and reinforced sand regarding the N/N_{peak}.

Key Words: Anzali sand, liquefaction, shaking table, relative density, grouted micropile.

LABORATORY STUDY OF THE EFFECTS OF RELATIVE DENSITY AND NON-PLASTIC FINES ON LIQUEFACTION POTENTIAL AND SETTLEMENT OF SATURATED SAND

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DETECTION OF DISPERSED DAMAGES OF 2D STEEL FRAMES USING AN ENHANCED MODEL UPDATING METHOD

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Abstract

During many decades, maintenance and behavior evaluation of civil structures are drastically become of more importance problem of urban planning. Many researchers have tried to present various efficient and effective methods to evaluate more reliable and much precisely structural damages especially in the beginning of the damage formation. Among different proposed methods, model updating method is truly known as an accurate and reliable method for detecting location and severity of structural damages. Model updating method is a properly substitution for the traditional methods. In this paper, a methodology for model updating of complex and/or irregular two degrees of freedom moment-resisting steel structures and braced steel structures is presented. In order to increase accuracy and performance of this methodology, model updating is designed to carry out in two stages. Damages may be much dispersed and their severities may be so small or much intense. This methodology is powered by an iterative sensitivity analysis using nonlinear constraint optimization, which is worked based on the Newton trust region algorithm. In order to shown capability of the proposed methodology, different damaged steel frames are examined. Model updating parameters are defined as stiffness reduction coefficients of members or a member is divided into some smaller parts. Updating is obtained during reducing differences between measured and analytical modal parameters of the structure. These param-