ABSTRACTS OF PAPERS IN ENGLISH

THE MECHANICAL ANALYSIS OF JOINTED ROCK MASS USING MESHLESS METHOD

N. Hataf
M. Hajiazizi
A. Ghahramani
Dept. of Civil Engineering
Shiraz University

Abstract
In this paper, the Element Free Galerkin Method (EFGM) has been used successfully to analyze the behavior of jointed rock mass. The penalty method has also been employed for the essential boundary condition. In the analysis of jointed rock mass using the mesh-based methods, specially when introducing joints, some difficulties, such as bad geometry, are encountered. The meshless methods, which only work with nodes, however, are free from the aforementioned problems.

In this paper, in addition to the relative displacement of blocks, the displacements of joints and nodes of each block are calculated using the Element Free Galerkin Method. The comparison between the calculation time consumed by the EFGM and that for the Finite Difference Method (FDM) has shown that the former is less than that for the latter.

RISK ANALYSIS OF EARTHQUAKE ON CONSTRUCTION PROJECTS FOR DIFFERENT REGIONS OF IRAN, USING SECOND ORDER AND GLS LINEAR REGRESSION, STATISTICAL TESTS AND POISSON STATISTICAL MODEL

M. Shokri Ghasabeh
University of South Australia

A. Bakhshiani
Faculty of Engineering
Tehran University
M. Mofid
Dept. of Civil Engineering
Sharif University of technology

Abstract
In this paper, for every construction project in one of the twenty seismic zones of Iran, whether it is in the design or construction phase or even as a finished project, a number is obtained representing the project risk coefficient or the probability of a specific earthquake in the utilization interval of a specific project. To find this number, for every abovementioned zone, the "Gutenberg-Richter" linear relation is used to demonstrate the relationship between earthquake magnitude and the number of earthquakes greater than, or equal to, a given magnitude. To check the existence of Heteroscedasticity and autocorrelation - which are two ignored terms in classic linear regression - for recorded data, some tests are applied. If each of the mentioned terms is found, treating techniques relating to that term, which is named GLS regression, will be applied to calculate the best regression line for the "Gutenberg-Richter" relationship. The second - degree relationship of the earthquake magnitude and the number of the earthquake is also assessed. Using Poisson statistical distribution and having the project design earthquake and project utilization interval as two concepts of earthquake magnitude and earthquake period, the third factor, which is design earthquake risk, will be obtained for a specific project in a specific location and for the indicated project utilization interval.

■

FINITE ELEMENT MODELING OF RETROFITTED REINFORCED CONCRETE COLUMNS WITH GLASS FIBER REINFORECED POLYMER

S. Eshghi
V. Zanjanizadeh
International Institue of Earthquake Engineering and Seimology

Abstract
This paper illustrates the finite element modeling of concrete columns with and without GFRP (Glass Fiber Reinforced Polymer) wraps. A series of Finite Element models were developed for pushover analysis. Two of them were built according to Iranian code (ABA) detailing and the rest of them according to ACI 318-Pre 71 detailing. Half of the models are assumed to be wrapped by FRP.

The analysis was a displacement control analysis with a 5 cm displacement applied at the top of the column, with various ratios of axial load, from 0.05 $A_g f'_c$ to 0.25 $A_g f'_c$. The analysis resulted in a force-displacement capacity envelope of retrofitted and unretrofitted columns. Only parts of the bottom of the columns were wrapped up to the recommended splice length of the bars.

It is shown that applying GFRP can increase the ductility, as well as the flexural strength, of the R/C columns. Also, a comparison between analytical and experimental results implies that the proposed modeling can be used with sufficient accuracy.

■

FREE VIBRATION OF CRACKED CYLINDRICAL SHELLS

S. Dehghani
H. E. Estekanchi
A. Vafai
Dept. of Civil Engineering
Sharif University of Technology

Abstract
Shell structures have various applications in Civil and Mechanical engineering. Shells, like other types of structure, are subject to damage and deterioration, such as development and propagation of cracks. In this research, the effect of a full penetration non - propagating macro crack, with various parameters, on natural vibration frequencies and mode shapes, is investigated. For this purpose, 400 cracked shell models have been created. These shells are grouped into cylindrical panels and full cylindrical shells and the effect of various parameters, such as crack length, crack orientation, thickness, poisson ratio, shell height and panel's central angle, on the vibration frequencies and mode shapes of the shells, has been investigated.

■

CALCULATION OF BEHAVIOR FACTOR FOR CONECNTRIC BRACED STEEL STRUCTURES

M. Sadegh Azar
M. Ghafoori
Dept. of Civil Engineering
Tehran University

Abstract

In this paper, after taking a lookat the importance of the degree of behavior factor and its application for structures, its objective and effective parameters upon its quantity have subsequently been investigated.

The quality of achieving this factor from one of the common methods (the method developed by Freeman) has been discussed. Then, parameters used in this paper for calculating the behavior factor have been defined and the behavior factor for two-dimensional V/Λ-shape steel braced coaxial structures have been obtained by allocating the restraint of the beam to the column and its base plate, in addition to considering strain hardening from Young's modulus as comparison. Finally, the results are reviewed.

CREEP AND SHRINKAGE CALCULATION IN TALL CONCRETE BUILDINGS USING NONLINEAR STAGED CONSTRUCTION METHOD

M. Ghebdian
A. Vafai
H.E. Estekanchi
Dept. of Civil Engineering
Sharif University of Technology

Abstract

In this paper columns shortening and differential shortening between column and wall in concrete frames are calculated using nonlinear staged construction analysis. Also, these effects are compared using Dirichlet series and direct integration methods considering the variations of different parameters for each frame. Two dimensional frames that are representative of frames in actual 3D structures with 15 to 45 stories are studied. Effect of creep and shrinkage on the design parameters is discussed. Results of this study can be helpful as a guide in estimating and understanding how creep and shrinkage can affect the behavior of concrete structures.

EFFECT OF SCRAP TYRE REPLACEMENT FOR AGGREGATE AND CEMENT ON COMPRESSIVE STRENGTH AND DURABILITY OF ORDINARY CONCRETE

M. Khorami
Building and Housing Research Center
A. Hajati-Modaraei
Faculty of Engineering
University of Guilan
Ch. Dehghanian
Faculty of Engineering
University of Tehran

Abstract

Scrap tires are counted as one of the non-recyclable materials in nature, which cause environmental maleffects. In the present research, the feasibility of applying scrap tire rubber in concrete is investigated. In this regard, some laboratory specimens are made and tested in two major groups. In the first group: crumb rubber was used instead of coarse aggregate and, in the second group, rubber powder was used instead of cement. A compressive strength test was done to recognize the strength behavior of the specimens and to investigate their durability under different conditions, two of the most significant tests (including: permeability and water absorption) were done.

The results revealed that the trend of strengthening in a 28-day-period could be determined via an experimental equation, which is conservative, and their compressive strength is similar to ordinary concrete. It is also to be mentioned that no significant changes in durability will occur, if the substitution percentage does not exceed a special limit.

STUDY ON THE INTERACTION OF SHALLOW URBAN TUNNELS AND ADJACENT OPEN CUT FOR LARGE BULDIGS - A CASE STUDY ON THE EXTENSION OF LINE ONE OF TEHRAN METRO

M. H. Sadaghiani
Sh. Elyasi
Dept. of Civil Engineering
Sharif University of Technology

Abstract

The interaction of the tunneling at a variety of depth and open excavation for large structures, is studied in this research. Stability during the construction and operation phases, deformation and displacement that have occurred on the ground surface are investigated for part of the extension of line One of the Tehran Metro, where the tunnel underpasses the surface structures. Very limited study has been conducted on this subject. In 1369, on line Two of the Tehran Metro, an investigation using site monitoring was done. No research had been conducted on the subject of the interaction of tunnel excavation and an adjacent open excavation in Iran.

In this research, finite element modeling was used. Construction stages of the tunnel and open cut were modeled. The stages involved excavation and installing the supporting system both in the tunnel and the open cut. Thorough sensitivity analyses on the effect of different parameters have been done. The parameters include the dimension (width and depth) of the open cut, the distance between the tunnel and open cut, type of supporting system and the timing of the construction of the tunnel and open cut, with respect to each other. The results of the sensitivity analyses helped to determine the most sensitive parameters and their effect and optimized the most appropriate construction sequence of tunnel and open cut.

■

WEAKLY NON-LINEAR EFFECTS OF FLOW OF A STRATIFIED FLUID ON MOTION OF SHEAR WAVES

M. Jamali
Dept. of Civil Engineering
Sharif University of Technology

Abstract

When water is withdrawn from a stratified reservoir, the flow at low discharges is confined to a narrow layer adjacent to the level of the sink. This phenomenon, known as selective withdrawal, has widespread applications in lake and reservoir water quality management. It is known that the formation of a selective withdrawal layer is due to the motion of internal waves called "shear waves" from the reservoir outlet to the upstream. The flow becomes steady when the shear waves are either blocked by the inertia of the background flow or damped by viscosity. In this paper, with the assumption of a small reservoir discharge, the weakly nonlinear effects of the reservoir flow on the motion of shear waves are investigated. A multi-scale perturbation technique is used to solve the governing equations. The results indicate that shear wave speeds are reduced by the background flow.