EuroSciCon

DAY 1

Scientific Tracks
& Abstracts

International Conference on

STRUCTURAL AND CIVIL ENGINEERING RESEARCH

June 06-07, 2019 | Paris, France

DAY 1

June 06, 2019

Sessions

Structural and Construction Engineering| Geotechnical Engineering| Structural Health Monitoring| Building Technology and Construction Management | Sustainability & Green Structures| Steel Structures and Construction| Tunnel Engineering and Construction | Reinforced Concrete Structure|

Session Chair
Achintya Haldar
University of Arizona, Tucson, AZ, U.S.A

Session Co-Chair
Eiki Yamaguchi
Kyushu Institute of Technology, Japan

Session Introduction

Title: **Technical-Economical Comparison of Embedded Retaining Walls**
Aguljeln Marku, POLIS University, Albania

Title: **Dissipation of Seismic Energy of the building by using Engineered Cladding System**
Arjana Hasani, POLIS University, Albania

Title: **An approach to strengthen reinforced concrete beam-column joints by unsymmetrical chamfers**
Siu-shu Eddie Lam, The Hong Kong Polytechnic University, Hong Kong

Title: **Reliability analysis of slope stability with plane failure surface**
Endri Duro,POLIS University, Albania

Title: **Displacement prediction of foundation pit retaining structure based on multiple response surfaces**
Jiang KaiYu, Southeast University, CHINA

Title: **Ferrocement composites for strengthening of existing school structures in Albania**
Merita Guri, POLIS University, Albania

Title: **Failure envelopes of rectangular closed diaphragm wall foundation in cohesive soil under combined loads**
Geng Cao, Southeast University, Nanjing, China

Title: **Studies of typical five-story buildings in Albania with URM typologies designed by old codes. Seismic performance through Modal Analysis and Static nonlinear Analysis Pushover**
Nikolla Vesho, POLIS University, Albania

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Aguljeln Marku et al., JET 2019, Volume:8

TECHNICAL-ECONOMICAL COMPARISON OF EMBEDDED RETAINING WALLS

Aguljeln Marku Merita Guri and Nikolla Vesho
POLIS University, Albania

Since the urbanization has raised the cost of land, it is necessary to go deeper into the ground and also towering vertically towards the sky. A deep excavation into the ground is fundamental for creating additional floor space to meet increasing space requirements for parking in multi-story buildings. Numbers of deep excavation city centers are increasing every year. Structures in the immediate vicinity of excavations and dense traffic scenario have made excavations a difficult task to execute. In this context, analysis and design of proper deep excavations and their supporting systems are essential. Even in complicated urban settings, deep retaining systems have been successfully applied by overcoming construction challenges. Nowadays Tirana, capital of Albania is lacking space for new residential buildings. So it is necessary to make interventions in soils for its stability in vertical cut in order to minimize risks in the structures nearby. The embedded retaining walls are presented as one of the best solutions. Embedded retaining walls are walls that penetrate into the ground and rely to a significant extent or even completely on the passive resistance of the ground for their support. Also ground anchors are used as a support for high depths. The embedded retaining walls taken in this study will be: pile walls, diaphragm walls and sheet pile walls. We will design these walls for different excavation depths. Finally for each kind of retaining wall, we will define the cost of materials, the cost of construction, and their displacements. Based on these conditions we will compare these retaining walls in order to define which wall is a better solution, based on technical-economical features, for each excavation depth that we have taken in the process of design.

Biography

Marku has completed his Master in Structural Engineering in 2016 from Polytechnic University of Tirana. In 2017, he starts the International PhD course at the University of Ferrara where he is currently carrying out his research studies around energy efficiency in residential buildings. Currently, he conducts didactic activities as Teaching Assistant at the Polis University in civil engineering sector in different courses such as Reinforced Concrete Structures and Steel Constructions. Since he joined POLIS in 2017, he has published some papers in reputed journals and took part in different conferences.

aguljeln_marku@universitetipolis.edu.al

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DISSIPATION OF SEISMIC ENERGY OF THE BUILDING BY USING ENGINEERED CLADDING SYSTEM

Arjana Hasani, Aguljeln Marku and Nikolla Vesho
POLIS University, Albania

Earthquakes, as we all know, are one of the worst natural disasters which have a potential to cause damages, disturbance to infrastructure and lifeline facilities. Therefore, the seismic design of the structure is very important for the behaviour of the structure and its seismic performance. Cladding panels are those precast elements which resist and transfer negligible load from other elements of the structure. This project examines the seismic energy dissipation potential of the structure by focusing on new specific joint to connect the cladding system with the main structure's frame. If we consider the traditional joint, we can say that the connection consist of rigid restraints of cladding panels resulting in seismic design that only considers the panel self-weight. This means that the contribution of the cladding system to the behaviour of the structure is negligible. Several studies have been carried out to study the interaction between the cladding system and the structure during seismic action. It has been concluded that if we are dealing with seismic design, the cladding system is capable of dissipating seismic energy. The objectives to be achieved for this study are to analyze the seismic reaction of the two buildings with simple cladding system panels; and with engineered cladding system panels (new special connection). Sub-objectives are analysis of different cladding systems and technology of joining panels; design of new joints that will be used as dissipation of seismic energy elements and study the interaction between cladding system and the structure during seismic events.

Methodology: Modelling a high building reinforced concrete/steel on ETABS, taking in consideration a specific earthquake as reference for the two cases mentioned above

Biography

Arjana Hasani has completed her Master's in Structural Engineering in 2018 from Polis University Albania. She has been working in two different construction companies as part of project team (structural team). Currently, she works as Teaching Assistant at the Polis University in Civil Engineering sector in different courses such as Statics, Construction Science and Foundation's Design. She has been part of many different trainings and international conferences such as: Geotechnical and Civil Engineering European Conference (October 2015); Digital YouthQuake, Belgrade (October 2016); Course 'New Construction Technologies', Prof Dr Luljeta Bozo 66th Geomechanics Colloquium, Salzburg 11th to 13th October 2017; 2nd International Students Science Congress, 4-5 May, Izmir, Turkey.

arjana_hasani@universitetipolis.edu.al

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AN APPROACH TO STRENGTHEN REINFORCED CONCRETE BEAM-COLUMN JOINTS BY UNSYMMETRICAL CHAMFERS

Siu-shu Eddie Lam, Zhihang Xue, Sohail Maqsood
The Hong Kong Polytechnic University, Hong Kong

Over the years, many methods have been proposed to strengthen reinforced concrete beam-column joints ("BCJs"), e.g. by jacketing using different materials. In buildings, strengthening will provide to have sufficient fire resistance, minimum alteration to building plans, and minimum impact to the environment, like dust and noise. It is the objective of this study to develop a strengthening strategy for BCJs with the above in mind. It comprises experimental studies to be completed in December 2018 and numerical studies which will still be on-going. In this study, unsymmetrical chamfers are proposed to enhance the joint shear capacity of BCJs. Chamfers are installed on the soffit of beams and concealed by the false ceilings, i.e. no alteration to building plans. Further, they can be constructed easily within one hour by unskilled labours and are especially attractive for hospitals and fire-station requiring minimum interruption of service. In the experimental studies, 17 BCJ specimens are tested to failure under progressive increase in cyclic deformation. Structural configurations are based on typical BCJs commonly found in Hong Kong. The specimens are at 2/3-scale and include interior BCJs, exterior BCJs and BCJs with unequal column sections. It is well demonstrated that, by developing compression chords in chamfers to resist the joint shear force, joint shear strength is increased. Mode of failure is shifted from joint shear failure to flexural failure in columns or beams. Numerical studies have also been carried out using finite element models and micro-truss elements. The former implements WCOMD, a non-linear finite element package for reinforced concrete and the latter is based on a 4-node truss element developed in this study. Performance of BCJs with chamfers is predicted numerically to understand the load transfer mechanism. Parametric studies will be applied to develop simple strut-and-tie model for the design of chamfers.

Biography

Siu-shu Eddie Lam has received his PhD in 1989 from the University of Southampton, UK. He is an Associate Professor in the Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University. He is a Fellow of the Institution of Structural Engineers and the Hong Kong Institution of Engineers, Registered Structural Engineer in both Hong Kong and China, Member of the Institution of Mechanical Engineers and a Barrister. His research interest is in Structural Engineering and Earthquake Engineering.

cesslam@polyu.edu.hk

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RELIABILITY ANALYSIS OF SLOPE STABILITY WITH PLANE FAILURE SURFACE

Endri Duro
Dept. of Architecture and Engineering Polis University, Albania

The slope stability issue in Albania is of great importance, because of the terrain configuration engineers cannot avoid the construction in difficult sites and unfortunately there are many cases where slides have occurred. As it is known, due to the complexity of the problem, many theories and analysis methods are developed, each one of them having their own simplifications and assumptions. When analysing a slope stability one has to take in consideration the fact that, like the vast majority of geotechnical engineering topics, the problem is characterized by many uncertainties which are mainly related to the geotechnical parameters (angle of friction, cohesion, weight density etc.) of the slope material, the potential slip surface (position and geometry), the slope geometry itself, the seismic force etc. That is why a probabilistic approach, to take account for these uncertainties and site variations, is needed in order to have more reliable results. The probabilistic approach of the problem can be achieved using what is called a *reliability analysis*, from which can be obtained the reliability index (β) and the probability of failure (pf). The purpose of this paper is to give a brief example on how the reliability analysis can be implemented in the slope stability analysis for the potential plane failure surface (simplified Culmann Method) and therefore to highlight its importance. This is achieved by using two common methods; Duncan Method as a simplified version of FOSM and Point Estimate Method (PEM).

Biography

Endri Duro has completed his Bachelor's studies in Civil Engineering in 2016 and his Master of Science Studies in Geotechnical Engineering in 2018 from Polytechnic University of Tirana-Civil Engineering Faculty in Albania. He currently works as an Assistant Lecturer at POLIS University in Tirana in subjects related to Geotechnical Engineering like: Soil Mechanics, Foundation Design, Soil Dynamics, Slope Stability, Soil Testing methods etc. Since January 2019, he is also Member of the Albanian Geotechnical Society (AGS), a member society of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE).

endri_duro@universitetipolis.edu.al

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DISPLACEMENT PREDICTION OF FOUNDATION PIT RETAINING STRUCTURE BASED ON MULTIPLE RESPONSE SURFACES

Jiang Kaiyu, Gong Weiming and Dai Guoliang
Southeast University, China

The displacement prediction of retaining structure is a key problem in foundation pit engineering which has many influencing factors and the function is highly non-linear, so there are some shortcomings such as low accuracy, slow convergence and heavy calculation when using traditional response surface prediction. The displacement prediction model using improved multiple response surfaces (MRS) is proposed to solve such problems. Taking the shear strength parameters of soil as the key design variables, taking the displacement of diaphragm wall retaining structure (DWRS) at different working conditions and different depths as the target parameters, the response surfaces between design variables and target parameters are established combining uniform test design method and ACE non-parametric regression technology. Based on Monte Carlo simulation technology and least square approximation principle, the original design parameters are inverted by using the monitoring data of existing working conditions and the established MRS. Finally, the displacement prediction of DWRS for following working conditions are obtained based on the modified design parameters. The case study shows that the values of displacement prediction are consistent with measured data based on MRS and the calculation convergence speed is fast, which can be used to guide the design and subsequent construction of foundation pit.

Biography

Jiang kaiyu is pursuing PhD degree in Southeast University and also a Teacher in Chongqing three Gorges University from China. His major research area is composite foundation and foundation pit engineering. He has published more than eight papers in reputed journals.

jiang_k_y@seu.edu.cn

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FERROCEMENT COMPOSITES FOR STRENGTHENING OF EXISTING SCHOOL STRUCTURES IN ALBANIA

Merita Guri, Nikolla Vesho and Aguljeln Marku
Polis University, Albania

The study includes analyses of existing school structures built with retaining unreinforced masonry, where some structural problems have been identified as a result of the degradation of masonry parameters over the years, which reduce their carrying capacity. In Albania, as a high seismic risk country, it is very important to design and evaluate anti seismic structures. From the economic point of view, there are two possibilities: their reinforcement or collapse to replace them with new structures. The possibility of choice is given to us after assessing their current situation and performance. The new and old Albanian design codes do not have established procedures for their seismic evaluation. For this reason, it is necessary to evaluate and improve the carrying capacity of these school structures projects selected in Tirana which are designed in accordance with the old codes [KTP-78, 1978; KTP-89, 1989], nowadays based on the calculation of structural Eurocodes such as EN1996, with ETABS software. Ferrocement is a low-cost material that improves resistance, stiffness and ductility for masonry school structures. The study provides recommendations and results for the application of this reinforcement technique to similar techniques applied in our country.

Biography

Merita Guri has completed her PhD in 2016 at Polytechnic University of Tirana and a Master of Second Level in Housing and Land Development in 2015. She has also a Postgraduate study in Conversion of diploma and recognition of Title "Construction Engineer for Civil and Industrial Buildings", Polytechnic University of Athina, 1994. She is the Head of the Civil Engineering department on the Faculty of Architecture and Design at Polis University. She has published more than five papers in reputed journals and has been serving as an Editorial Board Member of repute.

merita_guri@universitetipolis.edu.al

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FAILURE ENVELOPES OF RECTANGULAR CLOSED DIAPHRAGM WALL FOUNDATION IN COHESIVE SOIL UNDER COMBINED LOADS

Geng Cao, Wei-Ming Gong and Gou-Liang Dai
Southeast University, China

The rectangular closed diaphragm (RCD) wall is used in highway and railway bridge engineering. The foundations are subjected to combined vertical-horizontal-moment (V-H-M) loadings during operation especially when used as the foundation of arch bridge. In this study, the numerical modelling adopted in this study was verified by comparing the calculated capacities with those from previous studies. The results of a finite element study addressing the effect of embedment ratio (L/D) of RCD foundations on the bearing capacity under uniaxial and combined loadings are investigated. The kinematic mechanism accompanying failure under uniaxial loading is addressed and presented for different embedment ratios. A series of equations are proposed to predict the ultimate vertical, moment and maximum horizontal bearing capacity factors as well as to define the capacity envelopes under general combined loads generated with probe method. Predictions of the uniaxial bearing capacities are compared with other models and it is confirmed that the proposed equations appropriately describe the capacity of RCD foundations under uniaxial vertical, horizontal and moment loading in homogenous cohesive soils. Based on finite element analyses, the equation of failure envelope can be used to evaluate the stability of the rectangular closed diaphragm wall foundation in clay.

Biography

Geng Cao is pursuing his PhD, major in civil engineering in Southeast University in China, and also is a Teacher in Hanzhong vocational and technic college, Shaanxi Province, China. His research interests are the foundations of highway and Railway Bridge, and the rectangular closed diaphragm (RCD) wall foundation especially. He has published five papers in reputed journals.

caogeng@seu.edu.cn

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STUDIES OF TYPICAL FIVE-STORY BUILDINGS IN ALBANIA WITH URM TYPOLOGIES DESIGNED BY OLD CODES: SEISMIC PERFORMANCE THROUGH MODAL ANALYSIS AND STATIC NONLINEAR ANALYSIS PUSHOVER

Nikolla Vesho, Merita Guri and Arjana Hasani
Polis University, Albania

This paper presents the study and analysis of URM-Buildings (Unreinforced Masonry Buildings), traditionally used in Albania. This typology was built in the 1980s to 1990s. Also these structures are designed with the Albanian design codes KTP-78. Building type 77/5 is selected to be analysed, since it is considered as the most problematic model from the building stock designed before the 1990s, based on its plan geometry. The focus will be on the Modal and the Static Non-linear Analysis Pushover of this 5-Storey building, based on Albanian spectral demand and capacity curves. In this work the peculiarities of the global response of URM-buildings are shown with the aid of a simplified non-linear element model, realized with AM Quake v6.0 software, able to reproduce earthquake damage to masonry buildings and failure modes observed in experimental tests. Among the different methods developed in the last years, this work will follow the inelastic (constant ductility) response spectrum method. The application of this method to Albanian URM-building typologies points out the difficulties related to existing masonry buildings; the methodology, developed for concrete structures, shows some problems when applied to URM structures in relation to the own characteristics of this structural system. Traditional masonry buildings have often very flexible diaphragms (in some cases made of wood) and this prevents from assumption of absolutely rigid floors. Furthermore, a different architectural disposition of walls may contribute to localize damage to 'unexpected' parts of building, due to irregularities in plan and elevation.

Biography

Nikolla Vesho is currently attending the International Research Doctorate school in Architecture and Urban Planning-Cycle XXXIV (University of Ferrara, IT). He has two Masters of Science, first on Structural Engineering and second on Environmental Engineering; two Postgraduate certifications, first on Expert in Environmental Impact Assessment and Environmental Auditing and second on Evaluation of real estate. He is currently an Assistant Professor at the Polis University of Architecture on Tirana, AL. His fields of interest are Seismic Engineering, Rehabilitation and Retrofitting of Existing Structures, Theory of Structures and Advanced theory of structures. In the past, he worked as Structural engineer and temporary Seismology researcher at Speed Engineers Ltd. design studio, Tirana, AL.

nikollavesho@universitetipolis.edu.al