THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

8th Annual International Conference on **Civil Engineering**

25-28 June 2018, Athens, Greece

Edited by
Gregory T. Papanikos

2018

Abstracts

8th Annual International Conference on Civil Engineering

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(In Alphabetical Order by Author's Family name)

Preface

This book includes the abstracts of all the papers presented at the *8th Annual International Conference on Civil Engineering (25-28 June 2018)*, organized by the Athens Institute for Education and Research (ATINER).

In total 34 papers were submitted by 40 presenters, coming from 22 different countries (Belgium, Canada, China, Croatia, Czech Republic, Egypt, France, Germany, India, Iran, Iraq, Israel, Italy, Lebanon, Mexico, Portugal, Singapore, South Korea, Taiwan, Turkey, UK and USA). The conference was organized into 10 sessions that included a variety of topic areas such as sustainable infrastructure, innovative materials and more. A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven research divisions and 37 research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

Gregory T. Papanikos
President

8th Annual International Conference on Civil Engineering, 25-28 June 2018, Athens, Greece
Organizing and Academic Committee

ATINER's conferences are small events which serve the mission of the association under the guidance of its Academic Committee which sets the policies. In addition, each conference has its own academic committee. Members of the committee include all those who have evaluated the abstract-paper submissions and have chaired the sessions of the conference. The members of the **academic committee** of the 8th Annual International Conference on Civil Engineering were the following:

1. Gregory T. Papanikos, President, ATINER.
2. Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
3. Dimitrios Goulias, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA.
4. Ram Balachandar, Professor, University of Windsor, Canada.
5. Edward Minchin, Professor and Interim Associate Director, M.E. Rinker School of Construction Management, University of Florida, USA.
6. Timothy Young, Professor, University of Tennessee, USA.
7. Roberto Gomez, Academic Member, ATINER & Associate Professor, National Autonomous University of Mexico (UNAM), Mexico.
8. Herman Peiffer, Associate Professor, Ghent University, Belgium.
9. Hatem Abou-Senna, Assistant Professor, University of Central Florida, USA.
10. Fouad A. Mohammad, Academic Member, ATINER & Senior Lecturer, School of Architecture, Design and the Built Environment, Nottingham Trent University, UK.
11. Kasim Korkmaz, Assistant Professor, Eastern Michigan University, USA.
12. Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan.

The **organizing committee** of the conference included the following:

1. Fani Balaska, Researcher, ATINER.
2. Olga Gkounta, Researcher, ATINER.
3. Hannah Howard, Research Assistant, ATINER.
4. Eirini Lentzou, Administrative Assistant, ATINER.
5. Konstantinos Manolidis, Administrator, ATINER.
6. Kostas Spyropoulos, Administrator, ATINER.

FINAL CONFERENCE PROGRAM
8th Annual International Conference on Civil Engineering, 25-28 June 2018, Athens, Greece
PROGRAM

Conference Venue: Titania Hotel, 52 Panepistimiou Street, 10678 Athens, Greece

Monday 25 June 2018

08:00-08:45 Registration and Refreshments

08:45-09:30 Welcome and Opening Address (Room A - 10th Floor)

Gregory T. Papanikos, President, ATINER.
Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.

09:30-11:00 Session I (Room A - 10th Floor): Structures & Soil Structure Interaction I

Chair: Ram Balachandar, Professor, University of Windsor, Canada.

1. Mounir Mabsout, Professor and Chair, Department of Civil and Environmental Engineering, American University of Beirut, Lebanon, Elie Awwad, Associate Professor, Lebanese University, Lebanon, Kassim Tarhini, Professor, U.S. Coast Guard Academy, USA & Hudson Jackson, Associate Professor, U.S. Coast Guard Academy, USA. Wheel Load Distribution in Four-Sided Concrete Box Culverts.
2. Herman Peiffer, Associate Professor, Ghent University, Belgium. Stiffening of Kaolin Clay Treated with Paper Fly Ashes.
3. Sau-Lon James Hu, Professor, University of Rhode Island, USA, Shuai Cong, Doctor, Ocean University of China, China, Qian-Ying Cao, Doctor, Ocean University of China, China & Hua-Jun Li, Professor, Ocean University of China, China. Efficient Dynamic Analysis of Structures to Earthquake Loading by Pole-Residue Operations.
4. Alaa Morsy, Associate Professor, The Arab Academy for Science, Technology and Maritime Transport, Egypt & Youssef Elmezayen Ibrahim, Postgraduate Student, The Arab Academy for Science, Technology and Maritime Transport, Egypt. Parametric Study for R.C Wall with Opening Using Analytical F.E. Model.

11:00-12:30 Session II (Room A - 10th Floor): Innovative Concrete Materials I

Chair: Edward Minchin, Professor and Interim Associate Director, M.E. Rinker School of Construction Management, University of Florida, USA.

1. Kasim Korkmaz, Assistant Professor, Eastern Michigan University, USA & Suleiman Ashur, Professor, Eastern Michigan University, USA. Evaluation of Impacts of Crystalline Silica in Concrete on Construction Safety.
2. Tommy Yiu Lo, Associate Professor, City University of Hong Kong, Hong Kong. Measurement of Concrete Durability Using Laser-Induced Breakdown Spectroscopy.
3. Xinming Cao, Professor, Guizhou University, China. Mechanical Properties of Regional Confined Concrete Structure.

12:30-14:00 Session III (Room A - 10th Floor): Structures & Soil Structure Interaction II

Chair: Fouad Mohammad, Academic Member, ATINER & Senior Lecturer, Nottingham Trent University, U.K.

1. Roberto Gomez, Associate Professor, National Autonomous University of Mexico (UNAM), Mexico. Monitoring of Strains during a Load Test of a Bridge Pile Foundation.
2. Helena Barros, Associate Professor, University of Coimbra, Portugal & Carla Ferreira, Auxiliar Professor, University of Coimbra, Portugal. Study of Ultimate Design of RC Sections under Axial Load and Bending Moment.

14:00-15:00 Lunch

15:00-17:00 Session IV (Room A - 10th Floor): Special Topics in Civil Engineering	**15:00-17:00 Session V (Room B - 10th Floor): Design and Optimization**
Chair: Kasim Korkmaz, Assistant Professor, Eastern Michigan University, USA.	**Chair:** Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
1. Edward Minchin, Professor and Interim Associate Director, M.E. Rinker School of Construction Management, University of Florida, USA, Giovanni Migliaccio, Associate Professor, University of Washington, USA, Lourdes Ptschelinzew, Graduate Research Assistant, University of Florida, USA & Yuanxin Zhang, Assistant Professor, Guangzhou University, China. Best Practices for the Design Process for the Construction-Manager-as-General-Contractor Delivery System. 2. Ram Balachandar, Professor, University of Windsor, Canada, Vimaldoss Jesudhas, Research Associate, University of Windsor, Canada & Ron Barron, Professor, University of Windsor, Canada. Study of the Shallow Wake Characteristics of Emergent Slender Cylinders using DES. 3. Mohamed Moussa, Graduate Student, The American University in Cairo, Egypt, A. Samer Ezeldin, Professor and Chair, Department of Construction Engineering, The American University in Cairo, Egypt & Sayed Ismail, Assistant Professor, Ain Shams University, Egypt. A Risk-based Logistic Regression Decision Support Model for the Selection from The World Bank Lending Instruments. 4. Brwa Ahmed Saeed, Lecturer, A. S. Brwa / Ishik University, Iraq. Influence of Optimal Distribution of Dampers on Structural Vibration Control.	1. Benhur Satir, Assistant Professor, Çankaya University, Turkey. Turkish Red Crescent's Blood Collection and Blood Products Distribution Logistics Network Design. 2. Bin Cui, PhD Student, Hochschule Hannover, Germany, Martin Gottschlich, Professor, Hochschule Hannover, Germany & Ulrich Luedersen, Professor, Hochschule Hannover, Germany. CFD Simulation of a Rotary Swing Chamber Machine. 3. Maren Schmuck, Research Assistant, Hochschule Hannover, Germany, Erdenetuya Lepenies, Research Assistant, Hochschule Hannover, Germany & Ulrich Luedersen, Professor, Hochschule Hannover, Germany. Limiting Viscosity Number in CED-solution - Verification of a New Method through Round Robin Test to Evaluate the Effectiveness of Paper Deacidification Processes. 4. Gloria Polimeno, Data Scientist, Exprivia SpA, Italy. Designing Solution for Healthcare: A Case Study Combining Big Data and Blockchain Technologies. 5. Ylenia Maruccia, Data Scientist, Exprivia SpA, Italy. Talking Machines: How Big Data can help in Real-Time Anomalies Detection. 6. Zouhair Issa Ahmed Al-Daoud, Assistant Professor, Al-Bani University College, Iraq & Rasha Qasim Humadi, Lecturer, Al-Nahrain University, Iraq. Optimization and Evaluation of a factory Layout Design Problems.

17:00-19:00 Session VI (Room A - 10th Floor): ATINER's 2018 Series of Academic Dialogues A Symposium Discussion on *Future Developments and Prospects of Engineering and Science Education & Research in a Global World*
Chair: Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
1. Dimitrios Goulias, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA. University of Maryland's Civil Engineering Education & Research Activities in the Global World. 2. Ram Balachandar, Professor, University of Windsor, Canada. Recent Developments in Engineering Education and Research – The Canadian Experience. 3. Fouad Mohammad, Senior Lecturer, Nottingham Trent University, UK. Teaching Civil and Structural Engineering for the Next Generation. 4. Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan. Quantitative Education for Creating an Interface between

Statistics and Engineering.
5. Timothy M. Young, Director, Center for Business & Manufacturing Excellence (CBME) & Professor and Graduate Director, Center for Renewable Carbon, The University of Tennessee, USA. The Importance of Data Quality Management in the Era of Predictive Analytics.
6. Panagiotis Petratos, Vice-President of Information Communications Technology, ATINER, Fellow, Institution of Engineering and Technology & Professor, Department of Computer Information Systems, California State University, Stanislaus, USA. Current and Future Trends in Higher Education.

21:00-23:00 Greek Night and Dinner

Tuesday 26 June 2018

07:45-11:00 Session VII: An Educational Urban Walk in Modern and Ancient Athens

Chair: Gregory A. Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

11:15-13:00 Session VIII (Room A - 10th Floor): Sustainable and Resilient Infrastructure - Environmental Issues

Chair: Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan.

1. Samuel Hassid, Associate Professor, Technion – Israel Institute of Technology, Israel. EnergyPlus vs. Monthly ISO 13790 for Israeli Climatic Zones.
2. Hatem Abou-Senna, Assistant Professor, University of Central Florida, USA & Essam Radwan, Professor / CATSS Director, University of Central Florida, USA. Quantifying the Effects of Vehicular Driving Cycles on Air Quality.
3. Suleiman Hassan Otuoze, PhD Student, University of Birmingham, UK, Dexter Hunt, Senior Lecturer, University of Birmingham, UK & Ian Jefferson, Professor, University of Birmingham, UK. Review of Trends in System Resilience for Sustainable Future Transport in Megacities.
4. Soumya Kar, Research Scholar, BITS Pilani, India & Rajiv Gupta, Senior Professor, BITS Pilani, India. A Study on the Disposal and Efficient Re-use of Water Treatment Sludge Generated in a Household: A Review.
5. Helene Jeannin, Sociologist, Orange Labs, France. Technology Influencers and the Culture of Mobility: Experimenting Self-Ruling Floating Cities.

13:00-14:00 Lunch

14:00-16:00 Session IX (Room A - 10th Floor): Special Topics in Technology & Engineering

Chair: Timothy Young, Professor, University of Tennessee, USA.

1. Kyung Jin Cha, Associate Professor, Kangwon National University, South Korea & Hwa Jong Kim, Associate Professor, Kangwon National University, South Korea. Designing Conversational User Interface for Artificial Intelligence Devices.
2. Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan & Chung-I Li, National Cheng Kung University, Taiwan. A New Demerit Control Chart for Monitoring the Quality of Multivariate Poisson Process.
3. Su-Qun Cao, Professor / Vice Dean of Mechanical & Material Engineering Faculty, Huaiyin Institute of Technology, China. A Novel Feature Selection Method for Unsupervised Pattern.
4. Gyeunho Choi, Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea, Yongseob Lim, Assistant Professor, Daegu-Gyeongbuk Institute of Science and

Technology (DGIST), South Korea & Mingyu Choi, Assistant Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea. Case Studies of a Project-Based Learning Course in Transdisciplinary Engineering Program.

5. Chien-An Shih, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, Ming-Long Yeh, Associate Professor, National Cheng Kung University Hospital, Taiwan, Fei-Yi Hung, Professor, National Cheng Kung University Hospital, Taiwan, Chih-Kai Hung, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, Cheng-Li Lin, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, Chia-Lung Li, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, I-Ming Jou, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan & Wei-Ren Su, Chairman of Orthopedic Department, National Cheng Kung University Hospital, Taiwan. Biomechanical Comparison of Parallel, Posterior, and Y Configuration for Treating Comminuted Distal Humerus Fractures.
6. Arash Mazaheri, PhD Candidate, University of Zanjan, Iran & Amir Masoud Rahimi, Associate Professor, University of Zanjan, Iran. Synchro Software: Can be used to Enhance and Optimize the Performance of Urban Signalized Intersections with Queue Blockage?

16:00-17:30 Session X (Room A - 10th Floor): Innovative Concrete Materials II

Chair: Hatem Abou-Senna, Assistant Professor, University of Central Florida, USA.

1. Ivanka Netinger Grubesa, Associate Professor, Josip Juraj Strossmayer University of Osijek, Croatia, Ivana Barisic, Assistant Professor, Josip Juraj Strossmayer University of Osijek, Croatia & Ilijana Kljajic, Civil Engineer, Croatia. Polymer Modified Pervious Concrete.
2. Cise Unluer, Lecturer, Nanyang Technological University, Singapore. Influence of Carbonation on the Performance of Reactive MgO Cement-based Concrete Mixes.
3. Tomas Lovasi, Student, University of Chemistry and Technology, Prague, Czech Republic, Milan Kouril, University of Chemistry and Technology, Prague, Czech Republic & Sarka Msallamova, University of Chemistry and Technology, Prague, Czech Republic. Electrochemical Healing Techniques for Concrete Reinforcement Restoration.
4. Jose Ivan Escalante-Garcia, Research Scientist, Cinvestav Unidad Saltillo, Mexico, Karina Cabrera-Luna, Postdoc, Universidad Veracruzana, Mexico, Erick E. Maldonado-Bandala, Academic, Universidad Veracruzana, Mexico & Demetrio Nieves-Mendoza, Academic, Universidad Veracruzana, Mexico. Strength Evolution of Concretes Made with Supersulfated Binders based on Volcanic Materials Exposed to two Media.

20:00- 21:30 Dinner

Wednesday 27 June 2018
Mycenae and Island of Poros Visit
Educational Island Tour

Thursday 28 June 2018
Delphi Visit

Friday 29 June 2018
Ancient Corinth and Cape Sounion

Hatem Abou-Senna
Assistant Professor, University of Central Florida, USA
&
Essam Radwan
Professor / CATSS Director, University of Central Florida, USA

Quantifying the Effects of Vehicular Driving Cycles on Air Quality

Transportation is one of the primary sources of air pollution and GHG emissions. On-road mobile sources account for a third of the total air pollution in the US. Furthermore, the type of analysis and the level of detail utilized (macroscopic or microscopic) to calculate traffic emissions affect the results extensively. Traditional methods for creating emission inventories utilized annual average estimates. Instead, travel demand models were utilized to provide an intermediate level of detail using daily values. Currently, more accuracy has been established using microscopic analyses through the reduction of time and distance scales and utilizing second-by-second operations. The need to accurately quantify transportation-related emissions from vehicles is essential.

The latest United States Environmental Protection Agency mobile source emissions model, MOVES can estimate vehicle emissions on a second-by-second basis creating the opportunity to integrate it with a microscopic traffic simulation model (VISSIM). This research analyzed different levels of detail for predicting emissions from vehicles and shows how the various approaches affect predicted emissions of CO, NOx, PM and CO2. The results demonstrated that vehicle activity characterization in terms of different driving behaviors was shown to have a significant impact on air quality. Specifically, emission rates were found to be highly sensitive to stop-and-go traffic and the associated driving cycles of acceleration, deceleration, frequent braking/coasting and idling. Obtaining accurate and comprehensive operating mode distributions on a second-by-second basis is essential for predicting emissions. The proposed emission rate estimation process can provide policymakers with more accurate information when deciding on environmental transport policies for air pollution control.

Brwa Ahmed Saeed
Lecturer, A. S. Brwa / Ishik University, Iraq

Influence of Optimal Distribution of Dampers on Structural Vibration Control

At the end of last century, dampers were designed to absorb seismic energies in multi-story buildings at high seismic zones. Dampers are cost effective, so reducing number of dampers certainly decreases construction costs without having a significant effect on the structural performance, if and only if all the dampers are well distributed. The approach of optimal distribution is to implement dampers in places that the structure benefits from the full damping capacity of dampers to mitigate structural vibration.

The objective of this paper is to find the optimal placement and distribution of limited number of dampers to minimize the top story displacement, minimize the top and inter-story drifts, and minimize the top story acceleration. These objectives are achieved by absorbing most of the velocity at the first story.

This paper proposes a set of mathematical methods, a combinatorial formula is used to find the number of all possible cases for arranging three dampers in a ten story building. Exhaustive Search Method is used to find the optimal distribution of dampers based on the minimum response of the structure. A State Space Model is used to describe a system with a set of linear differential equations which they represent the equation of motion of the structure. Then, the system is simulated and solved in MATLAB software. Three real ground motions have been used to examine the method.

The results show that the distribution of dampers has a significant effect on the structural performance. The first story damper absorbs the most velocity generated from the seismic load. So, that to obtain the best results dampers should be implemented at the lower stories. In this study, three dampers implemented at the first three stories were more effective than five randomly placed dampers in terms of the study objectives.

Zouhair Issa Ahmed Al-Daoud
Assistant Professor, Al-Bani University College, Iraq
&
Rasha Qasim Humadi
Lecturer, Al-Nahrain University, Iraq

Optimization and Evaluation of a Factory Layout Design Problem

The study of factory layout design is not an easy task because there is no standardized or unified way to solve the layout problems of location planning and the use of modern management methods for production represents the necessary step for a successful industrial project. The choice of optimal production method, represented by selection of necessary machines for production, relies on the best planning and locating of workstations. The success of this step requires the determination of a set of information such as (machine size, operation planning type, layout type, department necessary space etc.).

The objectives of this research is to study the variables and requirements that are needed in the factory planning then achieving the optimum work elements, in order to obtain lowest handling cost of materials and the least possible transmission distance or any other standard approved to evaluate the identification of work elements and to allow workers, materials or customers to move within the work space more easily and effectively also find the best technological methods to work in production sites through optimal distribution of various production sites, minimum distance possible through which the material has to move. The least possible paths of required materials between operations, the optimal utilization of the available land area, reduce the congestion points and accumulation in the workstations. The planning of events in the fields of production plays an important role in facilitating the production processes by drawing a clear picture of the paths movement for (parts, semi-finished materials, finished products), also workers between different productions activities with minimum distance as possible.

The research included two aspects, the theoretical which includes the classification of production, the objectives of the planning processes and factors affecting it, types of planning and production processes and movement paths. The theoretical part also includes the steps of production planning location and the technical, engineering methods and tools used. The second side includes a case study in the General Company of Leather in Baghdad, Iraq. Where the focus was on studying and evaluating the planning, the current situation is now on the requirements and variables of the planning process of the number 7 factory for developing modern men's shoes. In this research, scientific and mathematical methods were applied to

assist in decision-making .Many mathematical models are used to contribute to the best ranking of workplace assets, considering that there is no algorithm, mathematical method or simulation model that ensures access to the best design of the workplace, but provides approximate solutions. There are two basic criteria on which the current design and determination of the plant have been assessed: Standard cost of material handling and the standard of the total distance between materials between different machines according to the general steps to produce different parts.

Due to the evolution of modern industry features and the tremendous progress in computing capabilities, Microsoft Visual Basic C++ 6.0 has been used in the current planning problem to achieve the best possible decision in the least time, effort as well as accuracy of distances and clarity of results. The design and current situation of the factory plant has been evaluated on the basis of the total distance standard. Thus, the value of the total distance between the machines used to produce each part of the men's shoe parts run by the raw material and semi-finished material on its way to reach a complete manufacturer part is 286.9 meters. A new design for the factory sites was reached. Through the proposed optimization results and comparing those with current location noticed that the total transit distance becomes 196.9 meters, thus reducing the transport distance by 68.63% for design also the total distance of the sewing division was reduced by 50.276% from 181 m to 91 also, reduce cost, increase productivity and increase profits.

Ram Balachandar
Professor, University of Windsor, Canada
Vimaldoss Jesudhas
Research Associate, University of Windsor, Canada
&
Ron Barron
Professor, University of Windsor, Canada

Study of the Shallow Wake Characteristics of Emergent Slender Cylinders using DES

Flow past vegetation in rivers and streams have received considerable attention in recent years due to their ecological and environmental impact. Vegetation patches interact with the flow and generate complex flow patterns that influence sediment, pollutant and nutrient transport in water bodies. Several researchers have attempted to study this complex flow field experimentally by modelling the vegetation as slender emergent cylinders. However, due to the limitations in experimental techniques, the measurements were often limited to the central (vertical) plane and transverse (horizontal) planes. While these measurements are adequate to provide valuable insights on the vertical variability of the wake characteristics due to the influence of bed and the free-surface, it was not sufficient to provide information on the location, shape and influence of the coherent structures present in the flow field. In order to address this shortcoming and fill the gaps in experimental results, 3D detached eddy simulation (DES) of the flow past emerged slender cylinders was carried out at Department of Civil and Environmental Engineering, University of Windsor. The free-surface deformations were captured using VOF multiphase model with high-resolution interface capturing (HRIC) technique. The present paper presents the results of the simulations of the flow past emergent cylinders at two Reynolds numbers. The velocity and turbulent characteristics of the flow field are validated with experimental results and are presented with additional analysis. The coherent structures in the flow are captured using λ_2 criteria. The influence of the free-surface and the bed on these coherent structures is presented with pertinent analysis. The advantages and shortcomings of using DES to simulate such flow fields is also evaluated.

Helena Barros
Associate Professor, University of Coimbra, Portugal
&
Carla Ferreira
Auxiliar Professor, University of Coimbra, Portugal

Study of the Ultimate Design of RC Sections under Axial Load and Bending Moment

The paper presents the analytical solution of cracked reinforced concrete cross sections under axial and bending moment for ultimate design, following Eurocode 2. The equations are obtained with a symbolic algebraic manipulator and compared to other formulations, obtained in the work of Simao et al. (2016) and Silva et al. (2009).

Different steel classes other than the S500 steel can be considered in the formulation. The results are presented for different bending moment and axial load in the form of tables and design abacuses considering the steel variation and layout.

Su-Qun Cao
Professor / Vice Dean of Mechanical & Material Engineering Faculty,
Huaiyin Institute of Technology, China

A Novel Feature Selection Method for Unsupervised Pattern

A novel feature selection method for pattern classification is proposed to provide a kind of unsupervised pattern based on unsupervised optimal discriminant vectors to achieve data reduction feature selection method for pattern classification technology. Fuzzy Fisher criterion as the objective function is used to obtain unsupervised optimal discriminant vector. According to each dimension value of the vector, the weights of features are sorted and according to the size of the given threshold, the feature subset is selected. Then the data dimensionality reduction can be realized which can be widely used in image recognition, data mining and so on.

Xinming Cao
Professor, Guizhou University, China

Mechanical Properties of Regional Confined Concrete Structure

Unlike normal confined concrete structure, Regional Confined Concrete (RCC) structure can be used in the places such as axial compression, eccentric compression, bending, shear and torsion. Based on the point of view "longitudinal bars, stirrups and core concrete work together and form an integral organism", the concept "confined entity" has been suggested which takes the constraint coefficient as basic variables. Combining with the characteristics of component under different strained condition, the mechanical models have been given and the corresponding calculation formulas are proposed that will be benefit to the practices of regional confined concrete structures.

Kyung Jin Cha
Associate Professor, Kangwon National University, South Korea
&
Hwa Jong Kim
Associate Professor, Kangwon National University, South Korea

Designing Conversational User Interface for Artificial Intelligence Devices

Recently there were many Artificial Intelligence speakers that got established and introduced such as Amazon Eco and Siri. Despite their popularity, worldwide promotion and high awareness, previous research has found that usage of such voice based Artificial Intelligence assistants did not reach its expectations. Such can be attributed to the fact that people started to feel and perceive conversational User Interface to be a bit overwhelming to interact. The primary emphasis of our research is motivated by the fact that UI/UX design for Artificial Intelligence devices should be studied differently with traditional UI/UX research, and voice-based Chabot interaction design process is quite complex phenomena to be investigated.

In this paper we provide key importance UI factors for successful Voice Chatbots design based on case example of kids watch and AI speaker designed by one of the telecommunication device companies in Korea. In addition, we also provide a UI design process framework that is aimed at creating service scenarios that can potentially improve user experience in conversational chatbot environment.

Gyeunho Choi
Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea
Yongseob Lim
Assistant Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea
&
Mingyu Choi
Assistant Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea

Case Studies of a Project-Based Learning Course in Transdisciplinary Engineering Program

We propose a unique educational program – Undergraduate Group Research Program (UGRP) - reflecting the megatrend of the rapidly changing 21st century on the era of the Industry 4.0. The UGRP is an innovative curriculum that enables students to become productive contributors to the future of society. We introduce the process and achievement of the UGRP through several cases. The first case was to understand the operating principle of the main hardware components of the autonomous vehicle (i.e., braking, steering, power and controller) and to develop autonomous driving algorithms by processing various sensors (i.e., Camera, GPS and LiDAR).

The main research contents have two parts: First, it is to study various sensor signal processing, vision and image processing technologies. Second, it is to develop control algorithm and verify autonomous vehicle driving performance. The vehicle verification follows two processes: (a) design and development of algorithms such as obstacle, lane, path recognition, (b) perform the optimization based on the hardware and software validation. The achievement was not only that submitted technical report was recognized as the highest level of perfection but also that the autonomous vehicle with developed algorithms successfully accomplished autonomous driving missions on the road in the 2017 International Student Car Competition. The second case was to search the domestic and overseas patents to find the patents of technologies. Students was to perform technical analysis of patents based on the keywords of interest and to obtain the patent-map for the strategy of developing technologies on business. In this case, students have learned the comprehensive processes of patents, such as patent searches with keywords, technical-based conversation about advantages and disadvantages of related patents through the patent technical analysis table and discussion about how to avoid patents by other technologies. Through this process, students have also learned how to acquire the patents and to build the business model through the acquired patents. Several ideas of three students in UGRP participants were selected as

outstanding ideas at the Domestic Convention Contest in 2017. Therefore, it is convinced that the proposed UGRP, which is a project-based collaborative program, has proven to be a creative subject requiring comprehensive and critical thinking.

Bin Cui
PhD Student, Hochschule Hannover, Germany
Martin Gottschlich
Professor, Hochschule Hannover, Germany
&
Ulrich Luedersen
Professor, Hochschule Hannover, Germany

CFD Simulation of a Rotary Swing Chamber Machine

Refrigerants for compressor air conditioners like R-1234yf, which is replacing R134a, are either polluting or highly flammable and highly toxic. If this gas burns, it can be very dangerous for human beings and the environment. Therefore, new technologies with environmentally friendly refrigerants are developed and tested.

An air conditioner, that can produce refrigeration without any chemical CFC-component is developed at the University of Applied Sciences and Arts Hanover. The engine is based on a rotary swing chamber system, which can be used for expansion and compression under high efficiency and consists of two interlocking rotors with four blades each. Due to the characteristic oscillating motion of the rotors, four moving chambers are created within the housing in which air can be expanded and compressed as a refrigerant. The machine operates in Joule process without phase change with a high volume turnover, fulfilled by 32 chamber fillings each rotation.

To evaluate and optimize the compression and expansion ratio and performance of the engine, a CFD simulation is carried out. Therefore different approaches are tested in order to find the right geometry and get more information about process parameters such as mass flux, temperature and pressure field within the chamber. The simulation will be used for first insights, before a prototype is constructed and built for further measurements and investigations.

Jose Ivan Escalante-Garcia
Research Scientist, Cinvestav Unidad Saltillo, Mexico
Karina Cabrera-Luna
Postdoc, Universidad Veracruzana, Mexico
Erick E. Maldonado-Bandala
Academic, Universidad Veracruzana, Mexico
&
Demetrio Nieves-Mendoza
Academic, Universidad Veracruzana, Mexico

Strength Evolution of Concretes Made with Supersulfated Binders based on Volcanic Materials Exposed to two Media

The sustainability of concrete can be improved by using low emission binders, such as the supersulfated cements (SSC), which are commonly formulated using blastfurnace slag, and activators of calcium sulfate and an alkaline activator commonly clinker of Pórtland Cement. This investigation presents results on concretes fabricated using an SSC with a binder based on volcanic materials which are an abundant and cheap in many parts of the world; the binders were composed by up to 75% pumice (PM) and the activators were combinations of hemihydrate (HH) and anhydrite (An), as well as lime (CaO) and Portland cement (CP). The cementitious content was about 700kg/m3 of concrete, and the highest CP load was only up to 140 kg/m3. The concretes were cured for 22h at 60°C and then at 25°C. The specimens were exposed to two conditions, dry open conditions in the laboratory and also submerged under water in a solution with 3.5% CaSO4 at 25°C for up to 180 days. The Taguchi method was employed to define the composition of the binder using three factors with two levels and an orthogonal array L4 (23). After 180 days, the concrete using a binder composed of 5%An-10%CP-10%CaO-75%PM exposed to the CaSO4 solution reached a compressive strength of 46 MPa y and 44 MPa under dry laboratory conditions, with an effective porosity (%□e) of about 4% at 28 days. The microstructure, analyzed by scanning electron microscopy, indicated a relatively dense microstructure, suggesting that the pumice had participated in the hydration reactions. The chemical analysis, by energy dispersive spectroscopy, of the cementitious matrix that the main hydration products were C-S-H and ettringite finely intermixed. These new SSC binders are a new possibility towards less use of Portland cement while maintaining good mechanical properties and durability.

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Monitoring of Strains during a Load Test of a Bridge Pile Foundation

The first high speed train in Mexico is under construction. For some parts of the railway project, standard load tests of deep foundations were required. By way of measuring and evaluating the response of the load specimen, a monitoring scheme was proposed.

Monitoring of deformations of the reinforcing steel and concrete was carried out with the help of strain sensors installed previously during the construction of the cast in place 1.50m diameter pile. The test comprised the application of a static axial incremental load, both in compression and tension. Time histories of strains were recorded in three transversal sections along the length of the pile. In this paper, the setup of a single test is presented including instrumentation tasks; results are discussed and recommendations for future work are provided.

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Polymer Modified Pervious Concrete

Pervious/permeable/no-fines concrete is a material with the same basic components as the standard concrete but designed to have high porosity. A pervious concrete mixture is composed of cement, water, and coarse aggregate, with or without a small amount of fine aggregate. Pervious concrete as a material was used for the first time in 1852 and patented in 1980. Although it is not a new technology, pervious concrete is receiving renewed interest today. The typical properties of pervious concrete are: good drainage properties, high noise absorption properties, ability to reduce urban heat islands, poor mechanical properties, low abrasion and freeze-thaw resistance. This paper deals with improving mechanical properties of pervious concrete by using polymer. Several mixtures of pervious concrete without and with polymer incorporated will be prepared and their properties in hardened state compared to each other.

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EnergyPlus vs. Monthly ISO 13790 for Israeli Climatic Zones

The energy efficiency, as predicted using on one hand the comprehensive building energy calculation program EnergyPlus and on the other hand the simplified monthly method of Standard ISO (EN) 13790, is compared for the four climatic zones of Israel. In two of those zones (Coastal and Negev Zones) cooling is dominant but heating is important; in another one, the Mountain Region, heating is dominant but cooling important and in the fourth one (Syrian-African Rift) there is essentially only cooling. The energy efficiency predicted by the two models is quantified as the percent reduction of annual heating plus cooling energy per unit area with respect to a pre-defined reference building. It is shown to be in fair agreement - with the simplified model being consistent with slightly better energy efficiency. The comparison is thought to be of relevance not only for the climates of Israel, but also for other climates in which cooling energy is as important as heating energy or more. The limitations of the comparison are discussed – especially the 24 hour heating/cooling assumption and the neglect of cooling latent heat in some regions.

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Efficient Dynamic Analysis of Structures to Earthquake Loading by Pole-Residue Operations

Conventional methods for dynamic analysis of structures to earthquake loadings have been exclusively carried out in the time or frequency domain. While time domain methods are often applicable to both linear and nonlinear structural systems, the required computational time—especially for complicate structures with repeated analyses in the design process—has always been a concern. In contrast, frequency domain methods are computationally efficient, but one main limitation of traditional frequency domain methods is that frequency domain methods compute only the steady-state responses. Also, frequency domain methods are under the presumption of periodic loading, and thus suffer the frequency resolution issues and leakage problems. The primary objective of this paper is to demonstrate an efficient method—which is operated in neither the time nor the frequency domain—based on pole-residue operations for computing the response of structures to realistic earthquake loadings. In this method, the poles and residues associated with earthquake loading are extracted by using the Prony-SS method, and those of transfer functions associated with the input-output relationship for the structures are computed by a conventional modal analysis. Sequentially, the poles and residues of a particular response are obtained by conducting simple algebraic computation using the poles and residues of the corresponding input and system transfer functions. Once the response poles and residues are available, the corresponding response signal is readily obtained. In the numerical examples, multi-story shear buildings to several recording earthquake signals were investigated. In addition to demonstrating the efficiency of the proposed approach, systematic comparisons of the proposed method against the time and frequency domain methods were conducted. It was found that the proposed method outperformed the conventional methods in both computational time and response accuracy.

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Technology Influencers and the Culture of Mobility: Experimenting Self-Ruling Floating Cities

For some libertarians, 'aquapreneurs' or 'seasteaders', creating floating cities in international waters could be a way to experiment with new forms of government and create 'start-up' countries. This spirit and the ethos of the modern-tech industry inspired the Californian founders of the Seasteading Institute. Their endeavors to promote their ideas led to an agreement signed in early 2017 with the French Polynesian government.

We propose to retrace the genesis of this project, starting with its influences, inspirations and high level contacts, as well as the various uses and purposes that were initially reviewed.

Then we will look at the communicational aspects that have contributed to give visibility and assist in its promotion. Architectural competitions have disseminated strong and recognizable visuals. How do technology influencers mix different types of campaigns to raise money and attract investment?

Regardless of the future form it takes (a platform, a huge ship or an artificial island), political, legal, and technical aspects are at stake – each with their pros and cons. Among those are the beliefs in a changing American Frontier, a new culture for urban mobility, and the paradisiacal yet ambivalent image of the island.

From the original point of view up to now, the principle of reality has prevailed. The Seasteading Institute has reoriented its strategy to move towards the blue economy and the creation of a Special Economic SeaZone near the islands of Tahiti as per the Polynesian government's desire. Whatever the issue, what lessons can be learned from this project?

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A Study on the Disposal and Efficient Re-use of Water Treatment Sludge Generated in a Household: A Review

Water is an integral part of this universe and plays a critical role in the functioning of the Earth's ecosystems. With an ever growing population's insatiable demand for clean water and increasing pollution of existing water resources, it has become a major challenge for authority to provide people with potable water.

Water treatment sludge (WTS) is the waste that is generated when raw water is passed through different treatment processes. It contains the pollutants present in the water along with the chemicals used for treatment.

With numerous initiatives aimed at providing people with safe water, several household treatment techniques have been developed like adsorption and Reverse Osmosis. Both these methods produce waste during the treatment process. RO produces around 40 to 50 percentage of waste water and the filtrate generated during adsorption has a high concentration of the contaminants removed. The WTS generated needs to be disposed off effectively to prevent leaching into the environment and re-contamination. This paper reviews the existing methods for disposal and beneficial reuse of water treatment sludge and identifies certain knowledge gaps, which will assist in the efficient disposal of the sludge produced in a water treatment unit at a household.

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Evaluation of Impacts of Crystalline Silica in Concrete on Construction Safety

Concrete is one of the most common used material in construction industry. Crystalline Silica which has fine particles is used as an additive in concrete construction. Around 2.5 Million people are dealing with concrete in manufacturing concrete blocks, concrete cutting, or other concrete related activities such as trending, drilling, cutting, or sawing concrete. The Occupational Safety and Health Administration (OSHA) has recently stated that, Crystalline Silica in concrete is hazardous to human health. The people at risk are inhaling the silica particles and may develop silicosis, lung cancer, chronic obstructive pulmonary disease, or kidney diseases. To protect people from exposure to crystalline silica, OSHA developed new respirable crystalline silica standards for construction. With this new regulation, Crystalline Silica quantities will be limited. This research work focuses on impacts of crystalline silica in concrete on construction safety. The research will evaluate the relationship between the crystalline silica and human health. The paper will discuss the reducing crystalline silica in the current design on the characteristics of concrete. An evaluation will be carried out for the current procedures for crystalline silica concentration during construction activities. Research findings will also provide recommendations on using control measures to reduce exposure to crystalline silica on site.

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Measurement of Concrete Durability Using Laser-Induced Breakdown Spectroscopy

Laser-Induced Breakdown Spectroscopy is an analytical technique that allows elemental compositions of a sample to be obtained in a few seconds, without any or with only minimal sample preparation. In this article, it focuses on the Sulphur ingression of concrete in different setting time and properties. Since Sulphur ingression is a serious problem to affect the functions of the concrete, it may influence the total life of an entire structure. In this paper, Sulfate penetration in concrete using LIBS will be measured by Laser-Induced Breakdown Spectroscopy and calibration curves of spectral line will be developed. Measurement Issues when using this technique will also be discussed.

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Electrochemical Healing Techniques for Concrete Reinforcement Restoration

Electrochemical chloride extraction from a reinforced concrete structure may be accompanied with an electrochemical injection of healing agents if such agents are positively charged and are able migrate towards the activated reinforcement. Positive charge carrying nanoparticles or cationic corrosion inhibitors might be the proper choice. Organic substances with a positive charge and their salts are mostly such inhibitors. Critical concentration of chlorides was investigated for fresh and carbonated concrete pore solution. Corrosion inhibition efficiency was evaluated by means of polarization resistance as a measure of corrosion rate. Sodium nitrite was taken as a reference corrosion inhibitor. Migration tests were performed in order to test the migration ability of promising cation corrosion inhibitors, namely guanidine carbonate, methylamine, tetrabutylammonium bromide, tetrabutylphosphonium bromide or triethylenetetraammine. Concentration profile of the inhibitors and chlorides was investigated in the testing concrete blocks. The best results have been obtained for guanidine carbonate and triethylenetetraammine up to now. Both showed migration ability and reasonable corrosion inhibition efficiency.

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Wheel Load Distribution in Four-Sided Concrete Box Culverts

Thousands of bridges with span lengths less than 20 feet (6 m) in every country, state, or municipality may not be inspected or replaced on regular basis due to the fact they are not reported to the federal government in the USA. Those bridges are left up to each local government to maintain, inspect, or replace without federal support. Prefabricated reinforced concrete culverts are often economical alternatives for replacing deteriorating short-span bridges and cast-in-place culverts. These prefabricated structures include reinforced concrete arches, three- and four-sided concrete or metal box culverts. The most commonly used type is the precast reinforced concrete culvert due to its durability, minimal field construction time, and it follows ASTM standardized box sizes up to 12 ft x 12 ft (3.6 m x 3.6 m).

This paper presents the results of a parametric study of wheel load distribution in four-sided precast concrete box culverts using three-dimensional finite element analysis (3D-FEA) and two-dimensional (2D) plane frame analysis. Several concrete box culvert sizes were chosen with various span lengths, constant rise, and standard laying width. The culverts are subjected to various combinations of earth loading from the soil cover, lateral earth pressure, bearing soil pressure at the bottom slab, and AASHTO HS20 wheel loading applied at center and/or edge along midspan of the top slab. As the soil cover increases from 0 to 3 m (10 ft), wheel loads are projected to the top slab using ASTM C890 procedure. Maximum bending moments and deflections from the 3D FEA results and 2D frame analysis were computed and evaluated. The finite element results showed that the effect of wheel loading along midspan is significant and that the edge loading condition for a single box is more critical than center loading for soil cover less than 0.9 m (3 ft). The earth loading tends to gradually dominate as the soil cover increases, which is expected based on geotechnical engineering practices.

It was shown that the plane frame analysis and 3D FEA gave similar results for long-span box culverts. However, for short-span (3.6 m or 12 ft)

concrete box culverts, the plane frame analysis was less conservative than the 3D FEA by about 15% for moments; versus about 5% for long-span culvert (7.2 m or 24 ft).

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Talking Machines: How Big Data can help in Real-Time Anomalies Detection

The advent of new technologies such as IoT, Augmented Reality, Robotics, Artificial Intelligence has led a major impact on an industrial scale paving the way towards the so-called Industry 4.0.

In this scenario of significant change for industry, Big Data play a key role thanks to the information generated through their analysis. The introduction of technologies such as IoT in machine monitoring has surely generated a huge amount of machine operation data, useful to understand not only how a machine is working, but also to predict any breakdowns and to schedule predictive maintenance interventions. But predictive analysis is only a first step in the field of next-generation maintenance, prescriptive analysis can actually facilitate real-time monitoring and allow the creation of case study such as what will be described in this paper.

Imagine getting access to the machines by creating a maintenance system that can highlight and detect a problem, through Machine Learning techniques, and to receive in an automatic and immediate way, the solution for that issue on smart glasses of the workman, through the use of mixed-reality.

The following case study describes the design and development of a system of intelligent and real-time monitoring of machines utilizing the large amount of data produced by sensors inserted into the machines that can provide useful and continuous information on their life.

The implementation of machine learning algorithms that can analyze and process the large amount of generated data allows real-time extraction of important information to monitor machine operating conditions. When an anomaly is detected, the system seeks, through semantic analysis techniques, the solution to the detected anomaly and sends it, immediately, on the workman's smart glasses who is able to manage the issue and to handle it in the best way possible.

This system can also provide remote support in order to increase the chances of success of the maintenance intervention. In this scenario, Big Data are at the basis for the development of such a structured system, but at the same time with a great innovative component as it combines important technologies together such as IoT, Big Data and Mixed-Reality. The definition of such a system increases customer service productivity and improves plant efficiency by offering a service that can anticipate failures and take corrective action in useful times.

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Synchro Software: Can be used to Enhance and Optimize the Performance of Urban Signalized Intersections with Queue Blockage?

Recently, with population growth and increased travel demand, the number of automobiles has increased and, as a result, traffic problems and crowdedness of passageways (especially in urban intersections) have escalated. Precise engineering designs matching country-specific countries gain more importance for traffic reduction over time.

In the past years, development of simulation and optimization software as well as software for timing traffic lights in intersections has increased. An example of such software is Synchro. These applications are designed in accordance with the traffic conditions in Iran to enhance traffic. This study was an attempt to assess the most common situations occurring in urban signalized intersections using this software. It was also tried to assess the precision, influence, and accuracy of the performance of this software. Since the measurements were carried out using information on the Amirkabir intersection in Zanjan City, it was tried to gain a better understanding of the traffic behavior in intersections. Moreover, the most important factors leading to an increase in the similarity between the assessment model and the real-world situation of Zanjan City were identified and assessed.

In this study, the following parameters were compared using the Synchro software and the results were assessed subsequently: the width of the effective line for traverse of automobiles; variations of presence of heavy vehicles; change of parking lines; automobiles and buses parked in the vicinity of intersections; and presence of pedestrians. It was concluded that the Synchro software can be used to enhance and optimize the performance of intersections in terms of the aforementioned five parameters.

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Best Practices for the Design Process for the Construction-Manager-as-General-Contractor Delivery System

In the early 1990s, the American driving public insisted that planned highway and bridge projects be completed quicker than was possible using the Design-Bid-Build (DBB) construction project delivery system, which had dominated the industry since the 1930s. This led state Departments of Transportation (DOTs) to explore fast-track methods of construction. In the late 1980s some DOTs had begun experimenting with using the Design-Build (D-B) delivery system. Forty-two state DOTs and numerous county and municipal transportation agencies now use the system. However, D-B has displayed disadvantages. This has caused DOTs and similar agencies to search for still another delivery system that might mitigate or eliminate those concerns while providing many of the advantages of D-B. A solution was offered by Construction-Manager-as-General-Contractor (CM/GC), a system that shows great potential, but designers have trouble with the speed of the construction process. This paper tells the story of the development of a guidebook by the research team that the FHWA has published and disseminated to all state DOTs to help them establish their design processes when using CM/GC to delivery their highway and bridge construction projects. Among the findings of the research are that the most important advantage of CM/GC is the innovations possible through the pre-construction services of the contractor as CM; the second biggest advantage of CM/GC is the flexibility it grants the participants, before and during the project, in assigning risk in the proportions that are best for project success. Other findings include that everything should be done to retain the CM as early as possible, and it is important that the design process enable the team to permit and design the project in small "mini" phases, and that this process be tailored to begin construction early.

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Parametric Study for R.C Wall with Opening Using Analytical F.E. Model

Earthquake is one of the most catastrophic events which make enormous harm to properties and human lives. As a piece of a safe building configuration R.C. walls are given in structures to decrease horizontal displacements under seismic load. Shear walls are additionally used to oppose the horizontal loads that might be incited by the impact of wind and also give additional stiffness for the structural. R.C walls in residential buildings might have openings that are required for windows in outside walls or for doors in inside walls or different states of openings due to architectural purposes. The size, position, and area of openings may fluctuate from an engineering perspective. Shear walls can encounter harm around corners of entryways and windows because of advancement of stress concentration under the impact of vertical or horizontal loads. The openings cause a diminishing in shear wall capacity. It might have an unfavorable impact on the stiffness of R.C wall and on the seismic reaction of structures.

Finite element modeling approach has been conducted to study the effect of opening shape, size and position in RC wall with different thicknesses under axial & lateral static loads. Finite Element Method using software package "ANSYS" becomes an essential approach in analyzing civil engineering problems numerically. Now we can make various models with different parameters in short time by using ANSYS instead of examine it experimentally, which consumes a lot of time and money.

The proposed F.E approach has been verified with other experimental programs conducted by other researchers and gives a very good correlation between the model and experimental outputs including load capacity, failure mode, as well as crack pattern and lateral displacement. A parametric study is applied to investigate the effect of opening size, shape, orientation, aspect ratio, position with different R.C. wall thicknesses. The research may be useful for improving existing design models and to be applied in practice, as it satisfies both the architectural and the structural requirements, in addition it could help researchers to continue research on R.C. walls based on the verified analytical model.

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A Risk-based Logistic Regression Decision Support Model for the Selection from The World Bank Lending Instruments

The International Bank for Reconstruction and Development (IBRD), a World Bank subsidiary, is one of the leading International Finance Institutions (IFIs) that fund infrastructure projects in developing countries. The Bank provides an array of funding services to its member states through its various subsidiaries. These services such as grants and soft loans are often least burdensome on general budgets of governments. However, there are significant differences in the nature of these funding instruments and their ability to address certain project risks. This paper utilizes the feedback of 21 international experts with adequate experience in World Bank funded infrastructure projects in order derive a logistic regression model that yields the recommended funding instrument. This paper focuses on two instruments provided by the Bank which are the Investment Project Finance (IPF) and the Program-for-Results (P-for-R).

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Review of Trends in System Resilience for Sustainable Future Transport in Megacities

The wellbeing of society is dependent on transport for movement of people and goods. As a vital critical infrastructure, transportation has become catalyst of socio-economic potentialities, productivity and security. The world population reaches a 7.5 billion mark in 2017, with projections to reach its numerical milestones of 9.7 billion in year 2050. Rising global population midst the existential threats of security, gust of weather as well as environmental pollution are as important to the future of transport in the fast evolving megacities. Hazards, threats and uncertainties to critical infrastructures are fast increasing resulting from trails of socio-economic, environmental and ecological footprints of human population, urbanization, risk and security problems. Resilience is closely related to resistance to taming vulnerability as the concept dominating core discourses and debates on sustainability of future transport assets. This work gauges the knowledge base of researchers through systematic review of published literature sources on the subject of transport resilience. The study involves content review, analysis and rating for a random sample of literature materials to access the awareness and seriousness accorded the problem. The findings are intended to serve as technical blueprint serving as sine qua non for sustainable transport to cope with uncertainties of both population and urbanization booms of the next decades.

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A New Demerit Control Chart for Monitoring the Quality of Multivariate Poisson Process

This study aims to develop a new demerit control chart suitable for monitoring the quality of a manufacturing process with multiple characteristics subject to multivariate weighted Poisson distribution. Considering the correlation among different quality characteristics and their degrees of influence on the final product, we propose a new statistic for demerit scheme which gives different weights to different quality characteristics. Then, a new demerit control chart for multivariate weighted Poisson distribution (WMP chart) is developed accordingly. Moreover, a simulation study is conducted to evaluate the detecting performances of our proposed WMP chart and multivariate Poisson control chart (MP chart) using the out-of-control average run length (ARL_1). Finally, a numerical example with a two dimensional telecommunication data set is given to demonstrate the usefulness of our proposed WMP chart. Both the simulation results and numerical example show that the detecting ability of our proposed WMP chart outperforms that of the MP chart when a process shift occurs. Hopefully, the results of this research can provide a better alternative for detecting the mean shifts occurred in a multivariate Poisson process.

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Stiffening of Kaolin Clay Treated with Paper Fly Ashes

The present report summarizes the research carried out at the Ghent University, to evaluate the performance of an industrial secondary-product (paper fly ash (commercial product Ecolime) as additive for soil stabilization. Ecolime is an ash with a significant lime content that results from the process of paper production. It is a residual product after incineration of paper and wood.

The experimental research consisted on monitoring the stiffening of a number of soil samples mixed with Ecolime. To this end, a non-destructive test was implemented to evaluate the small-strain stiffness of each specimen at different stages of curing.

Kaolin clay was chosen as reference clay material for stabilization. Commercially processed kaolin Rotoclay HB (Goonvean, St. Austell, UK) was used in this investigation. Kaolinite shows relatively low plasticity levels, comparable to commonly found fine-grained soils.

The non-destructive free resonant column test was implemented here to evaluate the small-strain Young's modulus (E0) of the soil specimens stabilized with Ecolime. The stiffening of Kaolin clay specimens stabilized with Ecolime at 6% dosage was monitored for a curing period of almost 200 days.

The results are discussed, in particular the E0 measurements on 4 different specimens. The limited scatter of data suggests good repeatability and reliability. Moreover, the non-destructive technique produced a well-defined and continuous E0 increasing pattern. E0 was observed to increase almost linearly with time up to the 60th day of curing approximately. After that, the stiffness increasing rate significantly decreased. The evolution of E0 reflects the evolution of interparticle cementation in the Kaolin clay fabric due to Ecolime addition. However, the beneficial impact of the additive may also be affected by the composition and properties of the natural soil and local groundwater. The first conclusions with regard to the application for soil stabilization are discussed.

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Designing Solution for Healthcare: A Case Study Combining Big Data and Blockchain Technologies

Nowadays the advent of the digital evolution has brought with it a growing availability of data. However, interesting data is not just those produced through social networks or the widespread use of mobile devices such as smartphones and tablets, but there is great importance and information in patient health data. Today, the expansion of this digital evolution allows to use the potential of digital communication technologies also in the field of Health, that can be defined as Health 4.0. The healthcare environment carries with it a wealth of data, structured and not, precious not only for optimal management of patient prevention and care but also for the management of medical processes, if appropriately protected and anonymous.

A Big Data approach is certainly crucial in order to manage, process and extract useful information from this huge amount of data. It is also essential in helping, on one hand the clinical research into a better understanding of health phenomena, and on the other hand it allows at optimizing typical processes of research by accelerating the development of new solutions, through machine learning activities.

While the use of Big Data models and tools provides an answer to the management and processing of these data, it is crucial to introduce different technologies that can guarantee the privacy and security of such sensitive data. The answer to this latter aspect is given by the application of the Blockchain paradigm.

This paper will describe a case study in the medical field that aims at creating a tool that allows management and access to large amount of health date in a shared and safe way. In particular, this platform will be able not only to make available different types of data (eg daily life data, diagnostic tests, data collected by wearable devices) properly anonymized at various levels, but also to guarantee people to have full control of their data leaving them to decide who can access their data, for which use and at what cost. This can be considered as a first attempt to combine two major approaches, such as Big Data and Blockchain, in order to define a health care solution that allows an unique access to personal data, the marked sharing of medical information in a secure and fast way.

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Turkish Red Crescent's Blood Collection and Blood Products Distribution Logistics Network Design

In the blood collection and blood products distribution logistics network of Turkish Red Crescent, there are many nodes such as Regional Blood Centers (RBC), Blood Collection Units (BCU), Blood Donation Centers (BDC), Transfusion Centers (TC), Test Laboratories (TL), etc. On some arcs between nodes, there may be multiple transportation options with different time requirements and costs. There may be opening/closing decisions of those nodes, assignment of BCUs to BDCs and BDCs to RBCs, transportation method selection on arcs, production amount decisions of blood products, etc. All those decisions affect the overall efficiency of the system. In this problem, we assume two basic objective functions to consider: time and cost. Design to minimize transportation time is effective especially for utilizing short shelf-life products: Thrombocyte Suspension (TS) and Erythrocyte suspension (ES). In order to increase their shelf life, transportation time should be minimized. The solution method requires multi-objective decision making approach.

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Limiting Viscosity Number in CED-solution - Verification of a New Method through Round Robin Test to Evaluate the Effectiveness of Paper Deacidification Processes

Written cultural artefacts, especially documents of the 20th century are highly relevant for the social and political development as well as for the examination of history. Many of them are now at risk of destruction and becoming more fragile over time due to degradation processes. High costs for the preservation of written cultural artefacts–beside the enormous need – is particularly caused by manually shaped treatment processes(e.g. restoration with Japanese paper, single sheet deacidification) as well as cost-intensive materials for the restoration and conservation according to the current state-of-the-art.

The University of Applied Science and Arts Hannover is currently developing an efficient and sustainable paper restoration process using nanofibres which will allow us to make written cultural artefacts permanently available nearly independently of the degree of their damage. The focus in on a fast and cost-efficient combined workflow including the stabilization of papers, tissues and similar materials and the reduction of acid decay, tears and fillers.

The functionalized fibres are produced via a coaxial electro spinning process. The process involves an injector with a polymer reservoir, a high voltage source and a grounded voltage collector. The connection between the high voltage source and the polymer reservoir leads to a charge accumulation in the polymer solution. The polymer as well as the solvent can be the charge carrier. Inside the leaking drop, the charge carriers move to the surface and overcome the cohesive forces if the voltage is high enough, usually dominated by the surface tension of the solution. An electrically charged jet of polymer and solvent is ejected from the drop. The polymer jet is stretched by neighboring charge within the electrostatic field. Due to the stretching process, the surface gets larger, leading to evaporation of the solvent evaporates and solidification of the polymer fibre. Selected alkaline components are then applied to the surface and examined for their utility and efficacy for deacidifying paper. The successful deacidification is analyzed by determination of the alkaline reserve. Furthermore, the influence of the thickness of the nanofibre on the readability of the written material is

evaluated and the coated paper is subjected to tensile tests and tear resistance tests.

The innovation potential of this approach is the use of a modern technology which enables a machine-assisted fast restoration. This technology is particularly relevant for archive documents that accumulate in large numbers and provides sustainable and durable results at a higher speed.

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Biomechanical Comparison of Parallel, Posterior, and Y Configuration for Treating Comminuted Distal Humerus Fractures

Aim: The purpose of this study is to compare posterior versus parallel distal humerus fracture fixation system in treating comminuted distal humerus fractures (DHFs).

Material and Methods: We performed a cadaveric biomechanical testing with posterior system plating (posterior two plating and single posterior Y plating), and parallel plating system to treat AO/OTA type C2.3 DHFs. In the three groups, we compared stiffness, intercondylar displacement before and after cyclic loading, and load to failure in both axial compression and posterior bending directions.

Results: In axial compression, there were no significant difference of stiffness and failure load between three groups. In posterior bending, both double plating system had higher stiffness and failure load than single posterior Y plating. Posterior two plating exhibited higher failure load than the parallel. Three fixation system showed no significant difference regarding intercondylar displacement changes after cyclic loading in both directions.

Conclusions: In this study, we found posterior two plating provides comparative biomechanical strength as parallel plating, and even higher posterior bending failure load than the parallel. Although single Y plating was weaker in posterior bending direction, it provided stable intercondylar fixation as compared to other two double plating systems.

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Influence of Carbonation on the Performance of Reactive MgO Cement-based Concrete Mixes

Reactive MgO cement-based formulations gain strength via carbonation, which increases sample density and stiffness and enables the evolution of the microstructure as the morphology and binding strength of the carbonate crystals contribute to the network structure. This process initiates with the hydration of MgO to form brucite ($Mg(OH)_2$, magnesium hydroxide), which can then react with CO_2 and additional water to form a range of strength providing hydrated magnesium carbonates (HMCs) within cement-based formulations. The presented work focuses on the use of reactive MgO in a range of concrete mixes, where it carbonates by absorbing CO_2 and gains strength accordingly. The main goal involves maximizing the amount of CO_2 absorbed within construction products, thereby reducing the overall environmental impact of the designed formulations and increasing strength. Microstructural analyses including scanning electron microscopy (SEM), X-ray diffraction (XRD) and thermogravimetry/differential thermal analysis (TG/DTA) are used in addition to porosity, permeability and compressive strength testing to understand the performance mechanisms. The amount of CO_2 sequestered is quantified to explain the mechanical performance of each sample, with the goal of achieving 100% carbonation through the careful design of mix composition and curing conditions. As a result, samples with comparable strengths to those containing Portland cement (PC) were produced, revealing the link between the mechanical performance and microstructural development of the developed formulations with the amount of CO_2 sequestered.