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2018 HKCBEES Prague Conference Introductions

Welcome to HKCBEES 2018 conference in Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic. The objective of the Prague conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Structure and Civil Engineering Research.

2018 2nd International Conference on Structure and Civil Engineering Research (ICSCER 2018)

- **Paper publishing and index:** **ICSCER 2018** papers will be published in the following Journals:

International Journal of Structural and Civil Engineering Research (IJSCER) (ISSN: 2319-6009, DOI: 10.18178/ijscer), which will be indexed by Index Corpernicus, ProQuest, UDL, Google Scholar, Open J-Gate; etc.

International Journal of Engineering and Technology (IJET)(ISSN: 1793-8236, DOI: 10.7763/IJET), which will be indexed by Chemical Abstracts Services (CAS), Engineering & Technology Digital Library, Google Scholar, Ulrich Periodicals Directory, Crossref, ProQuest, Electronic Journals Library, Index Copernicus, EI (INSPEC, IET).; etc.

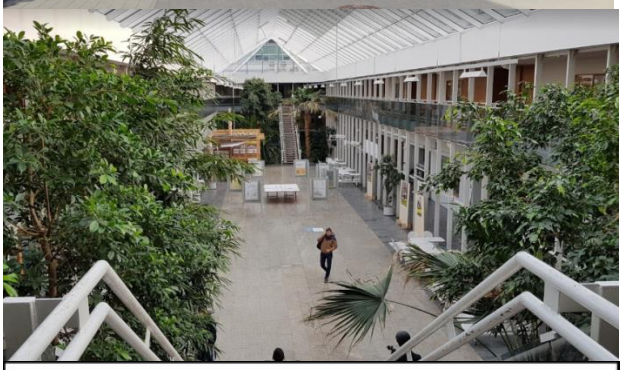
- **Conference website and email:** **http://www.icscer.org/; icscer@cbees.net.**

Conference Venue

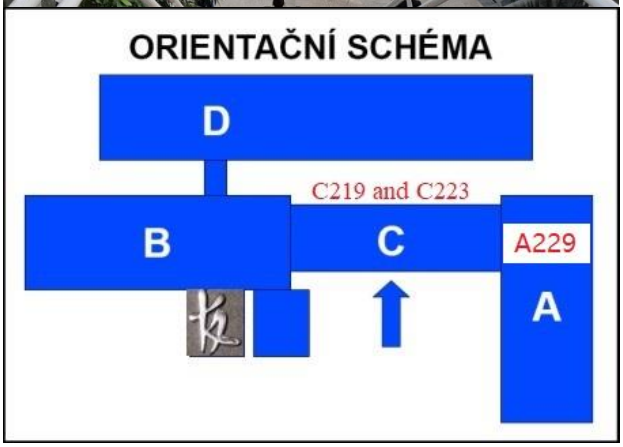
Faculty of Civil Engineering, Czech Technical University in Prague

http://www.fsv.cvut.cz/index.php
Address: Faculty of Civil Engineering, Czech Technical University in Prague, Thakurova 7/2077, 166 29 Prague 6 Dejvice

You enter the main gate of **building C** (the medium of building).

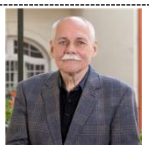


Registration will be arranged in atrium after you enter the main gate of building C



You come in atrium. On the left and right sight there are stairs to the second floor and rooms C219 and C223 are exactly above the atrium. In the **second floor are located rooms C223 and C219. Room A229** is in the **second floor** of **building A.**

Detailed Schedule for Conference

Day 1	**June 20, 2018 (Wednesday) 10:00~17:00** **Venue: Atrium of building C.** Faculty of Civil Engineering, Czech Technical University in Prague, Thakurova 7, 166 29 Prague 6, Participants Onsite Registration & Conference Materials Collection
Day 2	**June 21, 2018 (Thursday) 9:00~18:50** **Venue: Lecture Hall C223 & C219 & A229** Arrival Registration, Keynote Speeches, and Conference Presentations
	Morning Conference **Venue: Lecture Hall C223**
	 **Opening Speech** 9:00~9:05 Prof. Ing. Zbyšek Pavlík Faculty of Civil Engineering, Czech Technical University in Prague, Czech Republic
	 **Keynote Speech I** 9:05~9:40 (Prof. Ing. Milan Holicky from Klokner Institute, Czech Technical University in Prague, Czech Republic) Topic: "Operational Procedures for Estimating Fractiles of Random Variables in Engineering and Science"
	 **Keynote Speech II** 9:40~10:15 (Prof. Barry Jones from California Polytechnic State University, USA) Topic: "The Failure to Deliver Infrastructure Projects on Time and to Budget – do we have the right tools and contract strategies"
	Coffee Break & Photo Taking 10:15~10:45
	 **Keynote Speech III** 10:45~11:20 (Prof. Roberto San Jose from Technical University of Madrid (UPM), Madrid, Spain) Topic: "A health impact assessment of traffic restrictions during Madrid NO2 episode"
	 **Keynote Speech IV** 11:20~11:55 (Prof. Bedřich Moldan from Charles University, Czech Republic) Topic: "Implementation of environmental science and technology: Opportunities and barriers"
	Lunch 11:55~13:00 **Venue: Masarykova kolej**
	Afternoon Conference

	Session 1: 13:00~15:30 **Venue: A229** Session Chair: Prof. Ing. Milan Holicky 10 presentations-Topic: "Structural Engineering"	**Session 2:** 13:00~15:30 **Venue: C223** Session Chair: Prof. Roberto San Jose 10 presentations-Topic: "Environmental Biology and Environmental Management"	**Session 3:** 13:00~15:15 **Venue: C219** Session Chair: Prof. Bedřich Moldan 9 presentations-Topic: "Resource Management and Sustainable Development"
	Coffee Break 15:15~15:50		
	Session 4: 15:50~18:50 **Venue: A229** Session Chair: Prof. Sang Whan Han 12 presentations-Topic: "Civil and Urban Engineering"	**Session 5:** 15:50~18:20 **Venue: C223** Assoc. Prof. Vincenzo Torretta 10 presentations-Topic: "Environmental and Chemical Engineering"	**Poster session:** 15:50~18:50 **Venue: C219** 14 poster presentations.
	Dinner:19:00 **Venue: Restaurant**		
Day 3	**June 22, 2018 (Friday) 9:00~17:00** **Visit and Tour** **Morning:** Academic visit in Faculty of Civil Engineering, Czech Technical University in Prague **Afternoon:** Having tour in Prague city		

Note: (1) The registration can also be done at any time during the conference.

(2) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

(3) One best oral presentation will be selected from each oral presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on June 21, 2018.

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Poster Session

Presentation Instructions

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Duration of each Presentation (Tentatively):

Regular Oral Presentation: about **12** Minutes of Presentation and **3** Minutes of Question and Answer
Keynote Speech: about **30** Minutes of Presentation and **5** Minutes of Question and Answer

Instructions for Poster Presentation

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One best oral presentation will be selected from each oral presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on June 21, 2018.

Dress code

Please wear formal clothes or national representative of clothing.

Keynote Speaker Introductions

Keynote Speaker I

Prof. Ing. Milan Holicky
Klokner Institute, Czech Technical University in Prague, Czech Republic

Prof. Dr. Milan Holický got his civil engineering degree at the Czech Technical University in Prague, and doctor degree at the University of Waterloo, Canada. He is involved in the research of structural reliability and risk assessment. Since 1965 he is employed at the Klokner Institute of CTU in Prague and lecturing at the Faculty of Civil Engineering and Faculty of Architecture of CTU in Prague.
He is an author or co-author of more than 300 scientific and technical publications including textbooks and five monographs (three in English, published by Elsevier and Thomas Telford Publications). He is actively participating in international research within CIB (Conseil International du Batiment), JCSS (Joint Committee for Structural Safety, particularly in WP 2 Risk Assessment) and in international standardisation within ISO (International Organisation for Standardisation). Since 1991 he has represented the Czech Republic in the European Committee for Standardisation CEN (Comité Européen de Normalisation) in the Technical committee TC 250 "Structural Eurocodes".
Since 1990 Prof. Holicky closely cooperates with BRE Watford, UK, since 1997 he is BRE Associate. In 2010 he became Extraordinary Professor at the University of Stellenbosch, South Africa, in 2011 he was awarded degree Honorary Doctor of Science and Engineering of Moscow State University of Civil Engineering. Recently Prof. M. Holický was a coordinator of several research and educational European projects concerning Eurocodes. Presently he is a leader of the project team CEN/TC/250 SC2.PT1 developing Technical specification Assessment of existing structures.

Topic: "Operational Procedures for Estimating Fractiles of Random Variables in Engineering and Science"

Abstract: A fractile is the value of a random variable corresponding to a given probability of occurrence of values smaller than the fractile. It is an important concept used in many engineering and scientific applications. For example the characteristic and design strength of concrete are commonly specified as certain fractiles (corresponding to probabilities 0.05 or 0,001) of the strength. If a random variable is described by a certain theoretical model then the fractile is the point at which the distribution function attains the specified probability. However, estimation of fractiles from limited samples is more complicated. Two different approaches are commonly used: the classical coverage method and the prediction method. Operational procedures for both these methods are illustrated by practical examples. In addition, the Bayessian approach to fractile estimation based on updating of prior information by newly obtained evidence is presented.

Keynote Speaker II

Prof. Barry Jones
California Polytechnic State University, USA

Prof. Jones is a Senior Fulbright Scholar and Fellow of the American Society of Civil Engineers and Fellow of the Chartered Institute of Building. He has established an International reputation in Collaborative Engineering through his research focused on developing an integrated decision-support system for solving complex problems using a collaborative multi-agent approach. His contribution to the Construction Industry has developed through a first-hand knowledge of working or monitoring construction projects in the UK, USA and Internationally with different companies in senior project management positions. This provided a solid grounding of the construction professions and understanding of the business of construction. It was the springboard to establish his reputation as an academic who could relate to the research needs of the construction industry while still relating to the 'nuts and bolts' of the construction business. His current research focuses on the common links between PPP's* and IPD to create an integrating partnership for maximizing design and construction value. BIM and IPD linked to the "Big Room" form essential tools and strategies in this decision environment.

Topic: "The Failure to Deliver Infrastructure Projects on Time and to Budget – do we have the right tools and contract strategies"

Abstract: From the 80's the speaker, working for Shell EXPO in the UK, was involved with addressing the large cost and time overruns that were arising in the construction of oil and gas platforms. New project management tools were introduced and different collaborative ways for teams to work together and access information with less duplication were the focus. In the 90's Governments in many parts of the world started questioning the ability of the Construction Industry to deliver its projects on time and to budget. A new wave of research started addressing better ways of delivering projects using better decision analysis tools. The speaker at the time spent a short period at the Center for Integrated Facility Engineering (CIFE), Stanford University viewing various research projects including the use of intelligent computer agents. This led to PhD research in Collaborative Engineering at the University of Southampton, CE department, UK. About this time the Building Information Modelling (BIM) era was growing and is now seen as a large part of providing a more effective solution. Financing these large infrastructure project required collaboration between the Public and Private sector which added to the complexity of delivering to a fixed budget. With infrastructure projects becoming more complex and costly, a new delivery system came about in the 2000's called Integrated Project Delivery. So the construction industry now experience new tools(BIM) and new ways of team collaboration (IPD) but the Construction Industry still has alarming cost and time overruns on large infrastructure, water and power projects. Technically many of these projects that require complex engineering and construction are successful. But on the cost and time to deliver side they are often unsuccessful.

Keynote Speaker III

Prof. Roberto San Jose
Technical University of Madrid (UPM), Madrid, Spain

Roberto San Jose is a Professor of the Technical University of Madrid (UPM). He studied Physics in the University of Valladolid (Spain) and made the Ph. D. in 1983 on relation to Atmospheric Boundary Layer. He became associated professor in University of Valladolid in 1986. He was on leave in the Max-Planck Institute of Meteorology in Hamburg (Germany) in 1989-1990 and He was a guest senior scientist in the IBM-Bergen Environmental Sciences and Solutions Center in Bergen (Norway) in 1990-1992. In 1992 he moved to the Computer Science School of the Technical University of Madrid (UPM) in Madrid (Spain). In 2001 he became head professor of the UPM. In 1992 He started a laboratory in UPM called Environmental Software and Modelling Group. Up to now, Prof. San Jose has been principal investigator in more than 200 projects related with Air Quality and Climate issues. The projects were down with private and public companies and also with European Union. More than 20 EU projects on the environmental area and Information Technology have been carried out.

Topic: "A health impact assessment of traffic restrictions during Madrid NO_2 episode"

Abstract: One of the first decisions to improve the urban air quality during an air pollution episode is to apply traffic parking and access restrictions to try to decrease the amount of private vehicles driving in the city but their the effectiveness of the decisions must be evaluated before taking them. The health impact assessment tool of this work can help to the decision makers because it examines the citizen's health impacts of the applied measurements. The modelling system has been applied for a NO2 episode in Madrid city during December, 2016. The core of the system is the EMIMO-WRF/Chem air quality modeling system that simulates the air quality concentrations every grid cell of 1 km by 1 km and traffic emissions are calculated using data from a microscopic traffic model. The pollutant concentrations are inputs to the health impact module, which uses concentration–response functions. Two simulations were designed: "REAL" including traffic restrictions and "BAU" representing what would happen if no action were taken. The differences between the two simulations (BAU-REAL) give us the contribution of traffic restriction measures to improve the citizen ́s health. The results show that the measures taken in this specific case were not sufficiently effective compared to the effort to reduce traffic.

Keynote Speaker IV

Prof. Bedřich Moldan
Charles University, Czech Republic

Professor at the Charles University in Prague where he teaches, Prof. Bedřich Moldan also founded the Environment Center and was its Director from 1991 to 2014. He is also a member of several scientific and public policy bodies. His experience includes research on indicators of sustainable development (published two monographs commissioned by SCOPE) and various aspects of science-policy interface. He started his public life as the first Minister of Environment of the Czech Republic in 1990. Between years 2004 – 2010 he served as the Senator of the Parliament of the Czech Republic. From 2003 he is a member of the Governmental Council for Sustainable Development and the Chair of its Committee for Strategies. He held various international positions including Chairman of the UN Commission on Sustainable Development (2001) and Chairman of the Scientific Committee of the European Environment Agency (2000-2006). Some of his publication: • B. Moldan: A Subdued Planet, 2009, 2015 (Second Edition), Karolinum Prague, 520pp. (in Czech) • T. Hák, B. Moldan, A.L.Dahl (Eds.): Sustainability Indicators, 2007, SCOPE 67, Island Press, Washington, 413 pp. • B. Moldan: Ecological Dimension of Sustainable Development, Karolinum Prague, 102 pp (in Czech) • J. Klarer, B. Moldan (Eds.): The Environmental Challenge for Central European Economies in ransition, 1997, John Wiley Chichester, 280 pp. • B. Moldan, S. Billharz (Eds.): Indicators of Sustainable Development, 1997, SCOPE 58 John Wiley, Chichester, 420 pp. • B. Moldan, J. Černý (Eds.): Biogeochemistry of Small Catchments: A Tool for Environmental Research, 1994, SCOPE 51, John Wiley Chichester, 450 pp. • B. Moldan: Atmospheric Deposition: A Biogeochemical Process, 1991, Academia Prague, 108 pp.

Topic: “Implementation of environmental science and technology: Opportunities and barriers”

Abstract: Since the UN Summit in September 2015 where the 17 Sustainable Development Goals were accepted as the universal guide to the development of the global society and civilization the interest for and understanding of principles of sustainability increased substantially both among societies and enterprises. Individual Goals are quoted and followed in documents and guidelines of numerous institutions from public agencies to scientific and technological decision bodies to individual firms large and small. It should be stressed that the environmental sustainability element apart from being the explicit topic of the Goals 13, 15, and 15 is a more or less substantial part of almost all other Goals. This represents an important incentive for environment friendly technological and other initiatives especially in the context of the most important nature ́s contributions to people in the realm of water, energy, and food. However, some important barriers are hampering the rapid implementation of the progressive trends. These are well documented for the new energy systems but are equally important within the other two fields.

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

Session 1

Afternoon, June 21, 2018 (Thursday)
Time: 13:00~15:30
Venue: A229
Session 1: 10 presentations-Topic: "Structural Engineering"
Session Chair: Prof. Ing. Milan Holicky

K0002 Presentation 1 (13:00~13:15)

Construction Cost Estimation of Brazilian Highways Using Artificial Neural Networks

La ś B. Barros, Mar ía Marcy and Michele T. M. Carvalho
University of Brasilia/Civil Engineering Department, Brasilia, Brazil

Abstract- Estimating costs of construction projects more accurately at the project development stage is crucial for feasibility studies and it is a key factor for their success. Construction costs are often underestimated and recent statistical studies show that errors in cost estimation have not diminished. This paper focuses on the development of a more accurate estimation technique for construction highway projects using Artificial Neural Networks. Different architectures of the network with 10, 15, and 20 neurons were trained and tested with the backpropagation algorithm. Based on this, data from fourteen highway projects in Brazil were collected and analyzed. Eleven parameters that contribute the most to the construction final budget were found after trials and errors. For the best scenario, an average cost estimation accuracy of 99% was achieved. This preliminary study showed the feasibility of the tool applied to projects in Brazil and may be used by public agencies in the future.

K1016 Presentation 2 (13:15~13:30)

Performance Evaluation of a Newly Developed Translational Tuned Mass Damper

Md. A. Hossain, **Mohammad S. Miah,** Md J. Miah, and Md. M. Hossain
Dresden University of Technology - TU Dresden, Germany

Abstract- A tuned mass damper (TMD) is a cost-effective tool for targeting the vibration mitigation of a particular mode of structures e.g. first mode of vibration. Structures like a tall building, large span bridges, and other slender structures tend to be easily excited to high amplitudes. In order to deal with the aforementioned issues, TMD could be a good option that can reduce extreme vibration very effectively. The main objective of this paper is to show the implementation of a newly developed TMD to reduce the amplitude of vibration for an excited structure. The TMD was designed such a way that its parameters such as spring stiffness, mass can be adjusted. By tuning the early mentioned parameters, its frequency also be changed to meet the requirements from the structure. In addition, this work investigates the effect of TMD by observing the dynamic response of a two-storey frame structure both experimentally and

numerically. Finite element method has been used as a numerical tool to study the dynamic response of the steel frame-TMD system. The time-history (linear) analysis of the frame without (modal mass = 0%) and with TMD (modal mass = 5 and 15%) under earthquake load has carried out and the performances are evaluated and compared. It can be concluded that a significant reduction of response (i.e. displacement) is possible via the newly developed TMD. The maximum percentage of decrease in the displacement found to be reduced by 21% for the modal mass of 5% and 43% for the modal mass of 15%, respectively. Hence, it can be noted that newly developed TMD has potential to use in the real structure for vibration mitigation.

K0016 Presentation 3 (13:30~13:45)

A State-Of-The-Art Review on Retrofitting Beam-Column Joint Using GFRP with NSM Technique under Seismic Loading

Asma Nabila binti Abd Kader, **S. A. Osman,** and M. Y. M. Yatim
Universiti Kebangsaan Malaysia (UKM), Malaysia

Abstract- Recent development of seismic action has highlighted the consequences of poor performance of beam-column joints, which has been identified as the main principle cause of failure when the frame is subjected to earthquake loading. This paper summarized numerous past studies according to the type of beam-column joint, retrofitting techniques and fiber reinforced polymer (FRP). For this purposes, 100 research works from previous researchers were collected. The structural behavior of beam-column joint has been extensively studied in the past decades. Experimental and analytical solutions have been conducted and proposed by many researchers to understand the behavior of the beam-column joint. However, Near Surface Mounted (NSM) technique using Glass Fiber Reinforced Polymer (GFRP) in retrofitting beam-column joint has yet to be investigated. Therefore, this study is proposed for future research. In-depth investigations must be carried out as to gain more thorough understanding on the behavior of retrofitted beam-column joint using GFRP with NSM technique.

K0006 Presentation 4 (13:45~14:00)

Modeling of Lead Rubber Bearings via 3D-BASIS, SAP2000, and OpenSees Considering Lead Core Heating Modeling Capabilities

Zafer Kanbir, Gökhan Özdemir, Cenk Alhan
Istanbul University, Department of Civil Engineering, Istanbul, Turkey

Abstract- Seismic isolation systems can be modeled in various structural analysis programs using nonlinear or equivalent linear properties of isolators. The effort required and the accuracy of the results depends on the program and the modeling method used. In this study, three commonly used structural analysis programs, namely SAP2000, 3D-BASIS, and OpenSees, are studied considering modeling of Lead Rubber Bearings (LRBs) by means of linear and nonlinear representations. Base displacement (BD) and top floor acceleration (TFA) responses obtained from time history analyses under Kocaeli and Chi-chi earthquakes are compared. In case of nonlinear analyses, the temperature-dependent behavior of LRBs is modeled in OpenSees only, because of the inability of the other programs mentioned above in capturing the associated strength deterioration. It is revealed that there exists no significant

difference between the analysis results of three programs with the exception of the case where the temperature-dependent behavior of LRBs is of concern. It is found that there may be significant differentiation in structural response when the temperature-dependent behavior of LRBs is considered depending on the earthquake level which could have been confirmed by OpenSees program, only.

K0008-a Presentation 5 (14:00~14:15)

Seismic fragility response of buckling restrained braced frames under near-fault earthquakes

Nader Hoveidae, Jawad Kekemam
Azarbaijan Shahid Madani University, Iran

Abstract- Currently, buckling restrained braces as hysteretic dampers are categorized as popular seismic load carrying systems. In this study, seismic fragility response of buckling restrained braced frames is investigated through incremental dynamic analyses. The archetypes 4,6,10, and 14-story buckling restrained braced frames with three different configurations including diagonal, double story-X, and inverted- V were designed as per the Iranian building code provisions, and the seismic responses were compared. A set of near-fault seismic records were selected, scaled, and applied to the models to perform incremental dynamic analysis using OpenSees software. Seismic fragility curves were established based on the analysis results for two limit states including peak residual drift response and collapse prevention. It was concluded that at both collapse prevention and peak residual drift limit states, double story-X configuration exhibited better seismic performance and consequently lower vulnerability compared to other configurations.

K3003 Presentation 6 (14:15~14:30)

A Study on the Performance of Segment Used for PowerDuct Applying the Lattice Beam Rebar Net

Jeyoung Park, Sungwook Hwang and Youngshik Park
ISDongseo/Technology Institute, Seoul, Korea

Abstract- This study was performed for the segment lining, an underground structure. Rebar of existing segment is designed in the form of lattice, so the rebar is influenced by the stress of segment. The existing segment designed before the introduction of optimal design concept is evaluated as the over design up to the year of 2018.
In this study, we performed the tests intending to evaluate the structural performance of segment with an external diameter of Ø3400 by transforming the shape of internal rebar net. We plan to perform additional design work focusing on the optimized segment based on the results of these tests.

K1015 Presentation 7 (14:30~14:45)

Nonlinear Seismic Response Evaluation of Gradually Damaged Steel Shear Frames

Mohammad S. Miah, Md J. Miah, Md. M. Hossain, and Md. F. A. Faisal
Faculty of Civil Engineering, Dresden University of Technology - TU Dresden, 01187 Dresden, Germany

Abstract- The objective of this paper is to investigate the dynamical responses of damaged and undamaged steel frames under earthquake loads. To do this end, experimental examination on steel frames have been conducted to investigate seismic response. Most of the high rise buildings are made of steel and prone to extreme dynamic loads such as earthquake, gale, blast and so on. For the experimental investigation, herein, two two-storey steel shear frame type structures have considered executing experimental tests by employing scaled El Centro earthquake data. In order to compare the damaged frame response a reference undamaged frame is considered. The damaged frame was tested by damaging its column step-by-step in terms of reducing columns sizes of 5, 10, 15 percent, respectively. The experimental results have shown that the displacement of damaged structures (i.e., reduced column section) is higher than the undamaged structure. As the percentage of damage increased, the displacement of the structure increased. It is also observed that the frame was vibrating more for 25 sec than 20 sec probably due to the resonance. Additionally, numerical simulations are also conducted by using SAP2000 and the results are compared with experimental data and quite good agreement is observed.

K0001 Presentation 8 (14:45~15:00)

Internal force Analysis of Reinforced Concrete Structure with Bearing Column Girder Transfer Floor in Fire

KONG Wei-yi, FU Chuan-guo, SONG Ya-min
College of Civil Engineering, Southeast University, China

Abstract- A model of 4-story reinforced concrete structure with a large transfer girder in the first floor is established. Using the nonlinear FEM software ABAQUS to analyze the internal forces of the model which is exposed to fire and coupling with vertical loads. The internal forces of the transfer structure model in five kinds of fire conditions are analyzed, and the relation curves between the internal forces and heating time of member sections are plotted. The numerical results show that on the basis of the internal forces produced by the vertical load in room temperature, with the heating time increasing, the internal forces of the reinforced concrete transfer structure redistribute to varying degrees and that of some sections just change the magnitude, others also change the direction. The internal force redistribution mainly occurs within 90min of the initial fire, and the variation trend and range of internal forces caused by different fire conditions are also different. In the whole process of the fire, the internal forces of the transfer structure are constantly changing because of the effect of additional internal forces, especially the internal force superposition in some member sections may exceed expectations which are designed for room temperature, so it could impact the section safety. Therefore, the potential fire impact should be considered in designing the key structures like transfer structures.

K0010 Presentation 9 (15:00~15:15)

Application of Analytic Hierarchy Process in Safety Assessment of Reinforced Concrete Structures after Fire Disaster

Jia-Jie Cui, **Jun Deng,** and Xiao-Da Li
Guangdong University of Technology, China

Abstract- Many factors could affect the safety of reinforced concrete (RC) structures after fire disaster. Quantitative assessment of the safety risk of RC structures after fire remains a major challenge for disaster prevention and mitigation. In this paper, Analytical Hierarchy Process (AHP) was applied to evaluate the safety risk of RC structures after fire qualitatively and quantitatively. Firstly, three aspects-materials, geometries and functions were considered for ten safety evaluation indicators. Afterwards, the fire risk assessment model for RC structures was established and the model was used for a case study. Simultaneously, a workshop after fire damage in Jiangmen city was taken as an example and the AHP was applied to estimate the workshop structural safety risk. It is concluded that the evaluation results obtained by the AHP are in good agreement with the field identification results, which indicates that the AHP is applicable for safety risk assessment of RC structures after fire. The safety evaluation results based on the AHP can provide a reference for structural rehabilitation or demolition after fire, which is significant in fire disaster prevention and reduction.

K0011 Presentation 10 (15:15~15:30)

Comparisons of Three Different Sensors in Different Ambient Vibration Measurements

Onur Kaplan and Yucel Guney
Anadolu University, Turkey

Abstract- The accuracy of the vibration measurements is directly related to testing equipment. There are some reasons that affect the performance of instruments like sensitivity, internal noise level, temperature, pressure etc. The influence of instruments should be considered in vibration recordings. There are too many products on the market. For the researchers, the main struggle is to decide which sensors or digitizers or their combinations should be used for the defined study aim or the equipment which they have is suitable or not for their purpose of the study. There are limited studies in this field in the literature. In this study, three different sensors were compared in the frequency domain, a seismometer and two different accelerometers. The seismometer is Guralp CMG-6TD (G6), one of the accelerometers is Guralp CMG-5TCDE (G5) and the other one is TDG Sensebox-7021 (TDG). The measurements were conducted in a four-story, residential reinforced concrete (RC) frame building. G6 and G5, G5 and TDG were compared to each other in two different measurements. As a result of this study, in all comparisons, the first mode's frequencies were very close to each other and the frequency spectrums which established by means of the compared instruments were quite similar to each other.

Session 2

Afternoon, June 21, 2018 (Thursday)
Time: 13:00~15:30
Venue: C223
Session 2: 10 presentations-Topic: "Environmental Biology and Environmental Management"
Session Chair: Prof. Roberto San Jose

T0008-a Presentation 1 (13:00~13:15)

Bioavailability of Atrazine Non-linearly Bound on Biochars

Qi Yu, Jiao Hu and G. Daniel Sheng
Tongji University, Shanghai, China

Abstract- Bioavailability is a process that significantly influences the fate of contaminants in the environment. Using an activated carbon (AC) and two biochars (BC-600 and BC-400) generated by pyrolyzing cow-dung residues at 400℃and 600℃, a study was conducted to assess the bioavailability to bacteria of atrazine with non-linear sorption on these sorbents. The sorption isotherms of atrazine were well fitted to the Freundlich and Langmuir models, yielding differential sorption coefficients. Successive dilution and washing by deionized water resulted in rapid but only partial release of atrazine from BC-600 and BC-400, with 20-40% of the adsorbate remaining non-desorbed. By introducing the concept of both transient equilibrium and non-desorption sites, the non-linear desorption of atrazine from biochars was accurately simulated using the modified Langmuir model with an added constant term (with correlation coefficients R^2 ranging between 0.977 and 0.997). The non-desorption fractions of atrazine derived from fitting resembled highly those of direct measurement, with the deviation less than 2%. The degradation of atrazine by *Nocardioides sp. JCM 16518* in biochar extract solutions was much slower than atrazine desorption from biochars and well followed the *Michaelis-Menten* model. About 60-75% of atrazine that remained bound to biochars was directly utilized by bacteria and the degradation followed first-order kinetics. A model that couples non-linear sorption and two-site desorption with first-order kinetics was developed to successfully evaluate the bioavailability of atrazine non-linearly sorbed to biochars. In comparison, atrazine that was non-linearly sorbed on AC (10 mg g^{-1}) neither desorbed into water nor were available to bacteria.

T0017-a Presentation 2 (13:15~13:30)

Evaluation of Contaminant Removal Efficiency by Phytoremediation

Anfei He, Jing Jiang and G. Daniel Sheng
Suzhou University of Science and Technology, Suzhou, Jiangsu, China

Abstract-Phytoremediation is a green technology that removes contaminants from the environment via plant uptake as its main process. Its contaminant removal efficiency has yet to be further evaluated. The process of wheat seedling uptake of 4-chloro-3-methyl phenol

(CMP) was studied. Wheat seedlings were allowed to take up CMP (15, 45 and 60mg L-1) via roots from water for 48 h, during which CMP uptake kinetics, variations in seedling transpiration, and variations in fatty acid compositions in root and shoot cell membranes were determined. Uptake of CMP in roots reached steady state comparatively much slower than in shoots. The CMP accumulations in roots were slightly lower (~65%), and those in shoots were substantially lower (~5% only), than the estimates by the partition model. CMP uptake significantly reduced the transpiration of wheat seedlings (by 25-60%). The ratio of saturated to unsaturated fatty acids, i.e., the fatty acid saturation degree, in root cell membranes increased with increasing CMP concentration, indicating the decreased fluidity of these membranes. With these observations, the CPM uptake and accumulation resulted obviously in phytotoxicity to wheat seedlings, which decreased cell membrane permeability, leading to functional damages to the membranes. The suppression of continued plant uptake of organic compounds was thus mechanistically understood. That is, organic compounds accumulated in plants via root uptake produce phytotoxicity, which reduces plant transpiration and root cell membrane permeability, thereby suppressing continued uptake of the organic compounds. Potential technologies and/or management that lower the organic contaminant phytotoxicity and thus increase continued uptake of the contaminants are to be developed for enhancing contaminant removal efficiency during phytoremediation.

T0087 Presentation 3 (13:30~13:45)

Silver nanoparticles synthesised within the silica matrix in hyperstoichiometrical of mercury from aqueous solutions

A V Korobeinyk and V J Inglezakis
Nazarbayev University, Astana, Akmola, Kazakhstan

Abstract—Mercury adsorption of silver containing silica-based nanocomposites was evaluated. Maximum adsorption capacity of 0.4 mmol g^{-1} was achieved at silver loading of 0.5 mmol g^{-1}. Nevertheless, if to calculate in respect to silver content the mercury adsorption capacity was generally elevated along with decreasing silver nanoparticle diameter. It has been demonstrated that silver particle diameters and loading should collectively be taken into consideration in designing the optimal mercury removal process. Further recommendations have been proposed with the aim of increasing the mercury removal efficiency using silver nanoparticles deposited on the surface of silica with lover silver loading, while achieving similar or even higher efficiencies due to observed hyperstoichiometry effect.

T1018 Presentation 4 (13:45~14:00)

Study of changes in bacterial density in the internal environment of a hospital unit at 3 different incubation temperatures

Mohammad Reza Samaei, and Fariba Abbasi, Elahe Azizi
Shiraz University of Medical Sciences, Shiraz, Iran

Abstract- Hospitals are one of the most important places to provide public health. The hospital can become a source of pollution if they are not properly managed environmentally. Bacteria are an important category of airborne pathogens that are easily transmitted through the air. Although pathogenic agents are less likely to survive in the environment, some bacterial

species can withstand high levels of resistance in difficult, dry conditions such as low humidity or high temperatures. Thus, the risk of these biological agents can be evaluated by monitoring the survival rates of bacteria in the hospital air at various temperatures. Since all bacteria are not able to withstand various temperatures, they can easily be removed by changing the temperature of the environment. In this way, one of the most practical and easiest methods to determine the resistance of bacteria to temperature is the change in incubation temperature. Considering these, the aim of this study was to determine the process of changes in bacterial density in 3 incubation temperatures in ambient air in one of the southern hospitals in Iran. In this study, air samples were collected by Anderson Single Stage with a flow rate of 28.3 L / min for 10 minutes using the 0800 NIOSH method. The media used for bacteria was TSA and after sampling at 15, 25 and 37 °C temperatures, colonies were grown and then counted. After that, the samples were calculated in air volume and the results were analyzed using excel 2007 software. In this study, the bacterial density at 15, 25 and 37 degrees was 223, 343, and 92 CFU / m3, respectively. The results of this study showed that the average density of bacteria increased with increasing temperature up to 25 °C but decreased at 37 °C. Also, the average concentration was 15 degrees higher than 37 degrees. Although this trend has been observed in some parts of the hospital, in other departments such as emergency rooms, operating chambers before surgery and radiology, the highest density was when the environments were incubated at 15 °C. Considering the pathogenicity of bacteria grown at higher temperatures is higher than other bacteria. Because at high temperatures spores are formed, whose resistance is greater than the vegetative form of the bacteria, and in addition to the increased sensitivity of the human to spores. Also, according to the results of this study, in parts such as pediatric surgery that the coated population is more susceptible to pathogenicity, determining this trend of congestion changes at different temperatures can be important and a strategy to reduce these pathogenic elements in hospitals.

T2006-a Presentation 5 (14:00~14:15)

Content of biogenic amines in soybean seedlings (*Glycine* Willd.) and common duckweed (*Lemna minor* L.) in response to glyphosate contamination in soil and water

Łukasz Sikorski, Michał Baciak, Agnieszka Bęś, Kazimierz Warmiński, Barbara Adomas
University of Warmia and Mazury in Olsztyn, Poland

Abstract- Due to the widespread and frequent use of Roundup Ultra 360 SL for the production of crops, and because of its selective action towards plants, the active substance glyphosate may be toxic to plants other than the target plants.
Therefore, it is important to understand the physiological consequences of glyphosate action on the biosynthesis of biogenic amines and their role in counteracting of chemical stress.
The study investigated the effects of 0, 3, 7, 10 µM glyphosate contamination in soil and water on biogenic amines content of 9-day-old soybean seedlings and common duckweed. Biogenic amines were analyzed using amino acid analyzer AAA400 (Ingos, Prague, Czech Rep.).
In the soybean seedlings, the biogenic amines were identified: putrescine, cadaverine, spermidine, spermine and agmatine. In the roots of plants growing in the soil with glyphosate at concentrations of 3, 7, and 10 µM, cadaverine content increased by 136%, 167% and 226%, respectively, while in the stems it increased up to a maximum of 136%. Putrescine content in seedlings increased slightly but systematically

with increasing concentrations of herbicide. Spermidine content in the roots decreased.

In tissues of common duckweed: tyramine, putrescine, cadaverine, spermidine and spermine were identified. In control plants spermidine content was dominant and in tissues exposed to 7 μM of glyphosate increased by 42%. The content of tyramine, cadaverine, putrescine and spermine was the highest at 7 μM glyphosate.

These studies suggest that glyphosate in soil and water at concentrations ranging from 3 to 10 μM increased biogenic amines content of soybean and common duckweed. Soybean seedlings accumulated cadaverine and putrescine. Common duckweed accumulated also tyramine, spermidine and spermine. As it was demonstrated, the active substance of the herbicide Roundup Ultra 360 SL is not neutral to the soil and water environment.

T0021 Presentation 6 (14:15~14:30)

Screening of Solid Waste as Filler Material for Constructed Wetlands

Dina M R Mateus and **Henrique J O Pinho**
Smart Cities Research Center (Ci2), Instituto Politécnico de Tomar, Portugal

Abstract-The reuse of solid waste can contribute to reducing Earth's resource depletion, directly through use in the original production processes or by valorisation in alternative applications. In the present work, ten solid wastes were evaluated as candidates for filling material in constructed wetlands (CWs). For that purpose, physical characterization, leaching and adsorption tests were conducted. Limestone fragments and brick fragments resulting from construction activities, coal slags resulting from power plants, snail shells resulting from the food and catering industry, and cork granulates resulting from the cork industry have potential for use as CW fillers. These five materials have adequate physical properties and some capacity to adsorb phosphorous and organic compounds from wastewater. On the other hand, crushed eggshells resulting from egg farms, dealcoholized grape pomaces resulting from alcohol distilleries, olive seeds waste from olive-oil mills, and pine bark fragments and wood pellets resulting from forestry cleaning activities, wood mills and pulp mills did not demonstrate sufficient potential to be used as CW fillers, either because they have very low adsorption capacities or leach compounds in contact with water, or because they have less adequate physical properties. None of the tested solid wastes showed the ability to adsorb nitrogen compounds. Although the five selected materials do not present a special capability for adsorption of nitrogen, phosphorous and organic compounds, they can all be valued as CW fillers, representing a way to reduce the amount of solid waste sent to landfills.

T0033-a Presentation 7 (14:30~14:45)

Pilot study on the removal of emerging contaminants in biological wastewater treatment

Yonghwan Kim
Daisung Green Tech, Seoul, South Korea

Abstract- The accumulation of emerging contaminants in the environment has become an increasing concern. Although these contaminants are present in the environment at trace concentrations, many emerging compounds have significant bioactivity, and their effects on the environment and human health are largely unknown. Wastewater treatment plants (WWTPs) are the main routes for the introduction of emerging contaminants to natural

surface water as well as the primary barriers against their dispersion. However, existing WWTPs using conventional biological processes are not designed to remove these unidentified contaminants. Therefore, this study attempted to improve biodegradation during wastewater treatment to reduce environmental loading of emerging contaminants.

A pilot study was conducted in an existing WWTP in South Korea, which mainly treats municipal wastewater, with a total design capacity of 43,000 m3/d. To compare the removal efficiency of different operation conditions with the same influent, we installed four identical pilot plants, with capacities of 15 m3/day. Influent was taken from the distribution tank before secondary treatment at the WWTP and distributed to each pilot plant. The pilot plants consisted of A2O processes including anaerobic, anoxic, and aerobic tanks and clarifier, with the aeration tanks of two having been filled with media (bio-blocks). Routine sampling and monitoring were conducted on acetaminophen, carbamazepine, diclofenac, sulfamethoxazole, and trimethoprim.

T3001-a Presentation 8 (14:45~15:00)

Sandwich panels with honeycomb-corrugation hybrid cores for noise control

Yufan Tang, Fengxian Xin, Tian Jian Lu
Xi'an Jiaotong University, Shaanxi, China

Abstract- Noise control is one of the biggest environmental issues around the world. While lightweight sandwich structures have shown considerable advantages in attenuating noise in the past few decades, novel sandwich panels with perforated honeycomb-corrugation hybrid (PHCH) cores have exhibited great performance not only in mechanical stiffness/strength/energy absorption but also in sound attenuation. With almost no deterioration in stiffness and strength, introducing small perforations on both the facesheet and the corrugation leads to significant enhancement in low-frequency sound absorption. The influence of temperature upon sound absorption of this PHCH-cored sandwich panel is investigated in the current study using a combined analytical and numerical approach. It is demonstrated that temperature affects remarkably the low-frequency sound absorption performance of the sandwich structure, due mainly to the overall downward movement of the imaginary part of the specific acoustic impedance. It is also found that, even at high temperatures, PHCH panels exhibit superiority in low-frequency sound absorption. The proposed sandwich construction shows promising high-temperature applications as a multi-functional structure with simultaneous noise control and load-bearing capability.

T0072 Presentation 9 (15:00~15:15)

Comparative Life Cycle Assessment of Clinker Production with Conventional and Alternative Fuels Usage in Turkey

S Çankaya and B Pekey
Kocaeli University, Kocaeli, Turkey

Abstract- Recently, a considerable increase has been occurred in cement manufacturing, which is a highly intensive energy and resource consuming and carbon emission industry, in parallel with industrialization and urbanization. Turkey is the fourth largest cement producer in the world. Therefore, assessing the life cycle of clinker that is the main material of cement,

defining the most important environmental impacts arising from clinker production and practicing the best available production techniques is vital for environmental sustainability. In this study, life cycle assessment of clinker production with conventional fuels was carried out in Turkey (which was named as scenario 1). Additionally, alternative scenarios using alternative fuels (refused derived fuel and dried sludge) were developed and comparative life cycle assessment (LCA) study was performed. As a result of the study, the most environmentally-friendly scenario was determined as Scenario 6 using dried sludge to produce one tone clinker.

T1011 Presentation 10 (15:15~15:30)

Geographical Distribution and Risk Assessment of Heavy Metals in Nearby River of Heap Bioleaching Plant: A Case Study At the Zijin Copper Mine, China

M J Zhang, M J Sun, X Y Liu, Y B Li and X Yan
GRIMAT Engineering Institute Co., Ltd. (GRIMAT), Beijing,China

Abstract- The Zijin heap bioleaching plant was operated at the end of 2005. Concerns about the potential risk of environmental pollution from heap bioleaching plant arise due to the proximity to the Ting River. In this study, a physicochemical analysis, a geo-accumulation index and a high throughput sequencing technology were applied to determine heavy metals, assess the extent of heavy metal pollution, and research the effect of the heap bioleaching plant on the microbes, respectively. Results showed that the heap bioleaching plant had significant influence on the distribution of S, Pb and Cu and no significant influence on the distribution of As, Fe and Cr. Most of the water samples reached the third class standard of the People's Republic of China for surface water and individual water samples were above the fifth class standard of the People's Republic of China for surface water (GB3838-2002) because of As. The heap bioleaching plant had some effect on the microbial biomass, diversity and the microbial composition. However, the effect on the microbial biomass and diversity were not significant.

Session 3

Afternoon, June 21, 2018 (Thursday)
Time: 13:00~15:15
Venue: C219
Session 3: 9 presentations-Topic: "Resource Management and Sustainable Development"
Session Chair: Prof. Bedřich Moldan

T0050-a Presentation 1 (13:00~13:15)

Exploration of Optimal Policies to Balance the Mutual Constraints between Economic Development and Water Conservation in Zhangjiakou City, China

Ci Song, Jingjing Yan, Jinghua Sha, Gengyu He, Siyu Mou, Shule Li
China University of Geosciences, Beijing, China

Abstract- Balancing the complex interrelationships between the conservation of water resources and development of the social economy is of significance to sustainable development. Zhangjiakou City, one of the organizers of 2022 Olympic and Paralympic Winter Games, is designed as a water conservation and ecological environment supporting area of Beijing because of its unique location but has poor economy. Therefore, the dual constraints of its water resources endowment and external policies force the developers of Zhangjiakou City to confront the dual restriction of the water supply support guarantee and control of water pollutants. To solve the prominent contradiction between economic development and environmental protection in Zhangjiakou City, this paper developed a linear optimization model based on a dynamic input-output analysis to explore the optimal policies for harmonious development between economic growth and water conservation. The simulation results demonstrated that from 2013 to 2025, Zhangjiakou City will remain at an annual real gross regional product of 4.3%, with an annual chemical oxygen demand emissions reduction rate of 12.6%, and a series of water conservation targets designed by the local government will be achieved during the target terms. The proportion of primary, secondary, and tertiary industries would be adjusted to 16.65%, 35.12%, and 48.23%, respectively. The reclaimed water supply could increase 3.97 times, groundwater supply could decrease by 17.07%, total amount of water demand remain stable, industry water demand decreases by 5.25%, and ecology water demand increases 1.52 times. The comprehensive evaluation is suitable for simulating social economic development with the constraints of ecological environment conservation for regions with insufficient natural resources and supporting the ecological barriers in other regions.

T0027 Presentation 2 (13:15~13:30)

Surviving land use and land cover changes' effects on natural resources using GIS and satellite data

Vahid Rahdari, Alireza Soffianian, Saeid Pourmanaphi, Saeideh Maleki
University of Zabol, Sistan and balochestan, Iran

Abstract- This study integrates the use of multi spectral imageries for LULC change detection using the Landsat 8, OLI for 2016 and the Landsat 5 for 1998, TM images. The study area is Pelasjan sub-basin, the Gavkhooni watershed's upland and water resource of Gavkhooni international wetland. LULC maps were produced using hybrid classification. LULC Change detection was done with post-classification change detection and the trends of changes were determined. results have shown that during this time, 23347 hectares of natural vegetation was change to farmlands without capability for farming activities, which leads to more water usage, and on the other hand, during this time, 17233 hectares of agriculture area was left because of inappropriate land allocation. Change detection has shown that changes leaded to reduce 1679 hectares of water body areas have been changed to other LULCs Which shows more water demands in this area which had dramatic effects on lowlands.

T2003-a Presentation 3 (13:30~13:45)

Wetland land-cover mapping using TerraSAR-X data

S Maleki, N Baghdadi, A L Soffianian, M El-Hajj and S Soltani koupaei

Hamun international wetland research institute, University of Zabol, Zabol, Iran

Abstract- Wetland mapping is the first step in wetland monitoring and conservation process. But the dynamic conditions and narrow boundaries of wetlands make it difficult to map. In this regards, Synthetic Aperture Radar (SAR) systems are useful, because these data can be used to map the surface water extent, saturated soils, flooded vegetation, and changes in wetland vegetation cover. In this paper, TerraSAR-X with two incidence angles were applied in wetland land-cover mapping. TerraSAR-X-53°was acquired in 15/05/2017 and TerraSAR-X-22° was acquired in 29/05/2017. The backscattering analysis were done to determine the trend in X-band backscattering over the wetland land-cover classes. The support vector machine (SVM) method was used to classify the TerraSAR-X image. Based on our results TerraSAR-X-53° is the best incidence angle to map the water body. TerraSAR-X-22° is useful to separate submergent from emergent classes. Using TerraSAR-X-53°it is possible to determine the wet meadow. And both incidence angles have enough ability to separate the flooded vegetation from water. The results of this paper shows although both images were acquired in the same wave-length but incidence angle is effective in separating wetland land-cover classes. Thus the combination of low and high incidence angle is the best suggestion for wetland land-cover mapping.

T0026 Presentation 4 (13:45~14:00)

Application and Analysis of Bayesian Method and Grey Relational Analysis in Marine Water Quality Evaluation

Wenchao Zhang, HuiyingGao and HaiSun
Ocean University of China, Qingdao, China

Abstract- There are many factors that influence the quality of marine water. In order to make the evaluation process more efficient and accurate, based on the normal distribution principle and Bias formula, this article establishes the seawater quality evaluation model by Bayesian method. Taking the evaluation of water quality of a sea area in Qingdao as an example, the measured data of eight water quality monitoring points are selected. The results of the evaluation are compared with the grey relational analysis. It shows that the results of the two methods are the same, which are the I type of water quality. So the Bayesian method based on normal distribution is applicable to the evaluation of marine water quality and the Bayesian method has the characteristic of more integrated, suitable for both large and small samples, simple calculation and easily to be used widely.

T0010-a Presentation 5 (14:00~14:15)

Dual Decentralization and Green Economic Growth: A Perspective of Fiscal Competition

Yuanchao BIAN
Southeast University, Nanjing, China

Abstract- The system of fiscal decentralization in China highlights its dual characteristics of revenue decentralization and expenditure decentralization. Based on an elaboration of the internal mechanism of the impact on green economic growth from dual decentralization, this study calculates the Malmquist-Luenburger index concerning the non-expected output, such

as environmental pollution, to measure the green economic growth, and examines empirically the effects of dual decentralization on green economic growth using the Dynamic Spatial Durbin Panel Data Model. According to this study, the fiscal revenue decentralization has a significant positive impact on green economic growth through the direct effect, but the fiscal revenue competition will hinder the improvement of the green economic growth in the short or long term. The fiscal expenditure decentralization also has a significant positive effect on the green economic effect through the direct effect, but the indirect effect is not significant. Besides, the fiscal revenue decentralization has a significant positive impact on the efficiency improvement effect through the direct effect, but the effect of fiscal revenue competition is significantly negative. And the fiscal expenditure decentralization can also promote efficiency improvement through the direct effect. At last, the impacts of fiscal revenue decentralization and fiscal expenditure decentralization on the technological progress effect are insignificant.

T0019-a Presentation 6 (14:15~14:30)

Does the Internet Promote Green Total Factor Productivity in Chinese Manufacturing?

Xiai Shi
Southeast University, Nanjing, China

Abstract- Green development is a hot issue in China, and the information technology, represented by the Internet, has played a great role in the development of China's manufacturing industry. According to Chambers et al. (1996) and Oh (2010), we use the provincial panel data of China's manufacturing (2003-2015) to calculate the meta-frontier Malmquist-Luenberger (MML) productivity index, and its EC (efficiency change), BPC (change of the best practice gap ratio) and TGC (technical gap ratio). The estimation results of the econometric model show that the Internet is conducive to promoting the green total factor productivity (GTFP) of Chinese manufacturing. The results of different regions show that there are obvious regional differences in the impact of Internet on the GTFP of manufacturing industry. The Internet has the greatest impact on the GTFP of the eastern region, the second is the central region and the western region is the smallest.

T0024 Presentation 7 (14:30~14:45)

Review on Combined Methods for Sustainability Assessment and Development of Criteria-Set for a Systematization and Comparison Framework

Jan Bitter, Daniela Janssen, René Vossen and Frank Hees
RWTH Aachen University, Aachen, NRW, Germany

Abstract- In order to foster sustainable development in politics, society, technology (e.g. energy, mobility, industrial production) and other fields, it is essential to analyze and assess the sustainability of products, processes, strategies, organizations and actions regarding these fields. For that purpose, there are numerous approaches to sustainability assessment. A growing focus lies on multi-method or combined approaches. They offer the potential for integrated and holistic assessments regarding multiple sustainability dimensions, life cycle phases or input types. The variety of approaches impedes comparison and selection of the suitable approach for the respective assessment situation. This can lead to assessment errors and incredibility of results and thus, delay sustainable development. Systematization and

comparison frameworks are needed to overcome this gap. This paper provides three main outcomes. Firstly, a review of existing multi-method sustainability assessment approaches gives insights into the status quo and the characteristics of existing approaches. Secondly, a review of frameworks for systemizing and comparing assessment approaches provides an overview of perspectives and criteria for such frameworks. Finally, considering characteristics of multi-method approaches and criteria from existing frameworks, a comprehensive criteria-set is developed. The criteria-set marks the starting point for the development of a holistic systematization and comparison framework in future works.

T0049-a Presentation 8 (14:45~15:00)

Introducing an integrated policy to reduce the emission of air pollutants in Tangshan City, China

Yufang Ma, Jingjing Yan , Jinghua Sha , Gengyu He and Ci Song
China University of Geosciences, Beijing, China

Abstract- Tangshan City is an important resource-based city in the Jingjinji Area, China. Serious air pollution has occurred during the process of development in Tangshan City which also affects the atmospheric environment in the Jingjinji Area. Therefore, what policies should be adopted to realize the improvement of atmospheric environment and the sustainable development of society and economy under the constraint of atmospheric environment in Tangshan City are urgent problems to be solved. In this paper, we develop a dynamic optimization model by input-output analysis including three sub models: the socio-economic model, atmospheric environment model and energy model. The model is applied to Tangshan City to conduct 13 terms of dynamic simulation from 2013 to 2025 based on 2012 with the maximization of Gross Regional Product as objective function. The realistic basis for the operation of the model is to improve the atmospheric environment under the constraint of a clear level of atmospheric pollutant emission through introducing renewable energy, air pollution reduction policy and industrial restructuring, while achieving the optimal economic development in Tangshan City. The three sub models balance each other, different policy combinations are set by whether introducing renewable energy and emission reduction policies and assuming different emission reductions to conduct simulations. We adopt the integrated policy to achieve the goal of the reduction of air pollutants and sustainable development of social economy in Tangshan City by coordinating the relationship between economic development and environmental protection.

T3007 Presentation 9 (15:00~15:15)

Comparison of the Cyclic Variation of a Diesel-Ethanol Blend in a Diesel Engine

M H Mat Yasin, **A F Yusop**, R Mamat, A A Abdullah and N H Badrulhisham
Universiti Malaysia Pahang, Pekan, Pahang, Malaysia

Abstract- Alcohols are renewable and sustainable second generation biofuels which are derived from various biomass feedstock sources. These fuels with similar properties to mineral diesel can be used as a blend or additive to improve the combustion characteristics and pollutant emissions in the automotive engines. However, different fuel properties characterize different combustion phasing parameters for the specific engine operation and

test condition. This paper presents the preliminary results of coefficient of variations of IMEP (COVIMEP) and P_{max} ($COVP_{max}$) for a diesel engine fuelled with mineral diesel (B0) and DE10 blend at full load both engine speeds of 1100 rpm and 2300 rpm. The influence of ethanol content in a blend of diesel on the cyclic combustion variations is explained in the calculation values of the coefficient of cyclic variation (COV). The experimental results showed the DE10 fuelling exhibited larger cyclic variations than mineral diesel (B0) at the same test conditions, owing to the reduction of combustion temperature during combustion phasing and lower reactivity of ethanol.

15:15~15:50	**Coffee break**

Session 4

Afternoon, June 21, 2018 (Thursday)
Time: 15:50~18:50
Venue: A229
Session 4 12 Presentations-Topic: "Civil and Urban Engineering"
Session Chair: Prof. Sang Whan Han

K0025 Presentation 1 (15:50~16:05)

Permissible Heights Proposed for steel ordinary moment frames

Sang Whan Han
Department of Architectural engineering, Hanyang University, Seoul, Korea

Abstract—Steel ordinary moment frames (OMF) are often used in building construction as a seismic force-resisting system. Among three types of steel moment frames specified in seismic design provisions such as ordinary (OMF), intermediate (IMF), and special moment frames (SMF), design and detailing requirements specified for steel OMFs are the least stringent. To evaluate the seismic performance of steel OMFs, OMFs were designed according to current seismic design and detailing provisions considering different combinations of gravity, seismic, wind loads, as well as wind drift limits. FEMA-P695 was used for seismic performance evaluation. Then, permissible heights for steel OMFs are proposed based on the results of seismic performance evaluation.

K0020-a Presentation 2 (16:05~16:20)

Research on Seismic Response Characteristics of Suspended Monorail Transportation Bridge Structure

Pang Lin, Tao Qi, Zheng XiaoLong
China Railway Eryuan Engineering Group CO. LTD, China

Abstract- The track beam of suspended monorail is opening steel box girder. It has the characteristics of low structural rigidity, high live load-dead load ratio, low width-span ratio and low structural damping ratio. In order to research its seismic response characteristics, the vibration characteristics and damage evolution mechanism of different spans, pier heights and structural forms (simple supported beam and continuous beam) of suspended monorail are calculated by using finite element analysis software. The results show that: (1) Span and pier height have great influence on its seismic performance. (2) By using continuous box beam, the stiffness of Suspended Monorail Transportation Bridge Structure can be increased. It is beneficial to earthquake resistant behavior of the structure. The research results can provide reference for future seismic design of suspended monorail systems.

K4001 Presentation 3 (16:20~16:35)

The application of FRP in the shear reinforcement of bridges

Songsong Guo, Haifang He
Research Institute of Highway, Ministry of Transport in China, China

Abstract- Combined with the research results of scholars, analyze and summarize the research status of FRP from the main factors affecting reinforcement effect, the calculation formula of shear bearing capacity, bond-slip relationship, nonlinear finite element analysis. Then analyze and consider the practical application of FRP in the bridge reinforcement. The analysis concludes: (1) FRP type, spacing, binder, effective anchorage length, FRP number, the strength of concrete will affect final reinforcement effect; (2) the calculation formula in the existing FRP specification should be revised in practical application; (3) the relationship of the bond-slip will have an effect on the reinforcement and analysis of bridge; (4) the finite element analysis of FRP can be more accurate to analyze the effect of bearing capacity of strengthened bridge. With the study deeply of the performance characteristics and application methods of FRP, it will be applied more in the bridge reinforcement and the reinforcement effect will be greatly improved.

K0024-a Presentation 4 (16:35~16:50)

Seismic Responses of the Steel-Strip Reinforced Soil Retaining Wall with Full-height Rigid Facing from Shaking Table

Licong Cao, Jianjing Zhang, Xiao Fu, Yang Liu
Southwest Jiaotong University, China

Abstract- To investigate the seismic response of the steel-strip reinforced soil retaining wall with full-height rigid facing in terms of the acceleration in the backfill, dynamic earth pressure in the backfill, the displacements on the facing and the dynamic reinforcement strain distribution under different peak acceleration, a large 1-g shaking table test was performed on a reduced-scale reinforced-earth retaining wall model. It was observed that the acceleration response in non-strip region is greater than that in potential fracture region which is similar with the stability region under small earthquake, while the acceleration response in potential fracture region is greater than that in stability region in middle-upper of the wall under moderately strong earthquakes. The potential failure model of the rigid wall is rotating around the wall toe. It also was discovered that the Fourier spectra produced by the inputting white

noises after seismic wave presents double peaks, rather than original single peak, and the frequency of the second peak trends to increase with increasing the PGA (peak ground amplitude) of the excitation which is greater than 0.4g. Additionally, the non-liner distribution of strip strain along the strips was observed, and the distribution trend was not constant in different row. Soil pressure peak value in stability region is larger than that in potential fracture region. The wall was effective under 0.1g- 0.3g seismic wave according to the analyses of the facing displacement and relative density. Also, it was discovered that the potential failure surface is corresponds to that in design code, but the area is larger. The results from the study can provide guidance for a more rational design of reinforced earth retaining walls with full-height rigid facing in the earthquake zone.

K1009 Presentation 5 (16:50~17:05)

Alkali-activated fly ash-based mortars for green applications in architecture and civil engineering

Manfredi Saeli, Luciano Senff, Maria Paula Seabra and João A. Labrincha
University of Aveiro, Portugal

Abstract- Waste recycling is a compelling topic worldwide, especially in construction whose development is becoming highly unsustainable. Production and characterization of novel eco-composite alkali-activated mortars are reported. Specimens consist of a geopolymeric binder that uses biomass fly ash from a kraft pulp industry admixed with traditional construction silica sand in various proportions. Mix design is studied to investigate the effects of sand incorporation on mortars characteristics. Moreover, the effects of age and water addiction are analysed. Finally, a sustainable and reproducible manufacture is followed. The performed analyses indicate that the novel mortars can be used as structural material in construction and represent an efficient solution to reduce the environmental footprint associated with waste disposal.

K1014-a Presentation 6 (17:05~17:20)

Experimental study of tube segment uplift on the foundation treatment of immersed tunnels by sand-flow method

Yadong Li, Wei Li, Haihong Mo, Yingguang Fang, Jie Yuan, Wenke Huang
South China University of Technology, Guangzhou, China, China

Abstract- The whole tube segment uplifting process of foundation treatment for immersed tunnel by sand-flow method was imitated by the model experiment of sand-flow method based on full-scale test. A series of suitable reaction parameters such as the amount of tube uplifting, the radius of sand deposit, the water pressure of system and foundation trench gap, the compactness and the structural form of sand deposit were obtained through the real-time monitoring of sand deposit and the observation of sand deposit digging.
The analysis showed that the increase of foundation trench gap water pressure and the changes of sand particle deposition mode were the direct cause of tube uplifting. The process of tube uplifting could be divided into three stages of pulsatile up stage, rapid up stage and smooth up stage. It was also found that the tube uplifting process which had no effect on the pressure of sand pump outlet and the uniformity of sand deposit extension would influence

the expanding rate of sand deposit radius significantly. The distribution of water pressure of foundation trench gap in space was demonstrated as cylindrical cone distribution. The peak value of water pressure and the time point of tube uplift start were determined by the weight of tube. The compactness of sand deposit was between loose and middle-lower dense. The uplifting process of model board could compact the sand deposit to some extent which caused the sand deposit a binary structure with the characteristics of upper dense and lower loose. The results gained through this study can be applied as references for the design and construction of the foundation treatment for immersed tunnels by sand-flow method.

K0015 Presentation 7 (17:20~17:35)

Variation of Physical Properties of Cement over Time

Md. Riazul Haque, Sumit Purkayastha and, Md. Abdul Muktadir Khan
Bangladesh University of Engineering and Technology (BUET), Bangladesh

Abstract- Cement, a binding material, is considered the key ingredient of concrete which is used in construction. Physical properties of cement indicate the quality of cement. But these properties change after a certain period, which may lead to unsuitability of use in construction. In the experiment, physical properties of cement like normal consistency, setting times, fineness, soundness and compressive strength have been determined following ASTM (American Society for Testing and Materials) & BDS EN (Bangladesh Standards Engineering Division) standards. Experiment has been carried out for two types of cement sample- PCC (Portland Composite Cement) 42.5N and OPC (Ordinary Portland Cement) 52.2N, using two standards on the same day at 0th, 4th & 8th week from the manufacturing date of cement. Maintaining a controlled environment of humidity and temperature in the laboratory, change of physical properties over time has been analyzed from November, 2016 to January, 2017. The experimental result shows that the cement remains perfect for use till 8th week (approximately 2 months) from the manufacturing date and the values of physical properties remain within the specified range of ASTM & BDS EN standards; except the compressive strength of PCC 42.5N, which is lower than that of BDS EN standard.

K3002-a Presentation 8 (17:35~17:50)

Overview and recent challenges of steel framed houses in Japan

Ryoichi Kanno
Nippon Steel & Sumitomo Metal Corporation, Japan

Abstract- Currently Japan is one of the most advanced countries that enjoy benefits from modular or prefabricated houses in residential market. Amongst various existing prefabricated systems, steel framed houses are the one developed as the earliest type and currently accepted as one of the popular housing systems. In this presentation, starting from a short history of prefabricated housing systems in Japan, advancements and recent challenges of steel framed houses are overviewed with an emphasis on relatively new steel framed system developed extensively in the past twenty years. The new system focused here was developed, based primarily on the North American system, that is, cold-formed light-gauge steel framing assembled with wall and floor panels made primarily of galvanized steel sheets. In this system, most of the members and panels are prefabricated at shop and assembled on site very

quickly. Because Japan is seismically active, seismic design as well as shear walls and connections became major parts of its R&D activity. Initiated from one- to two-story single-family houses, the application has been extended to three-story houses and then to four-story apartment houses. In this presentation, two types of steel sheathing shear walls newly developed for four-story houses were explained in detail.

K2003 Presentation 9 (17:50~18:05)

The Effect of Greenery Strategies and Sky View Factor on Mean Radiant Temperature in an Arid Climate

Suaad J. Ridha, Mustafa A. M. Al-Shammari, and Hussein K. Khalaf
University of Mustansiriyah, Iraq

Abstract- Global warming, which is also referred as climate change, is considered as one of the critical environmental issues nowadays that comes with anticipated effects of increasing global temperatures. Reactions to this climate change and concern about its effects are also increasing. Thus, possible responses to this change are being taken, including different ways such as future climate engineering. Therefore, this work intends to observe and discuss the impact of greenery strategies and wind speed for the urban area with high rise buildings and maximum sky view factor on the urban microclimate. The mean radiant temperature is used as the indicator for the thermal comfort. The study was conducted on the hottest day in summer in Baghdad city by the evaluation of vegetation, mean radiant temperature to assess the human comfort in high rise buildings area. The assessment was done on the hottest day where the mean radiant temperature, sky view factor, air temperature distributions have been analysed using ENVI-met version 4.0 which allows simulating three-dimension geometrical configuration that performs an essential role in controlling longwave radiation heat loss, which shows the effect of different patterns of greenery strategies on the climate in the area of study. As a result of this modelling process and among the four scenarios that were simulated, the scenario of green ground was found as an effective solution to provide thermal comfort during summer time in the study area.

K1013 Presentation 10 (18:05~18:20)

A Comparative Study of Chinese and American Rural Design Guidelines

Dongzhu Chu and **Rouhan Li**
Faculty of Architecture and Urban Planning, Chongqing University, Chongqing, China

Abstract- Rural design guidelines is one of the statutory instruments identifying and interpreting directions for rural development on the basis of the actual needs of rural development, securing and normalizing procedures of rural design, construction, and management, guiding and controlling environment and landscape features of the rural space. Guidance and control mechanisms have been respectively established in China and the U.S for rural development, for which rural design guidelines are critical evaluation references, guidance standards, and instruction documentations. This paper outputs a definition for rural design guidelines, and thoroughly analyzes 37 pieces of rural design guidelines from 15 states of the U.S and 44 pieces of guidelines from 15 Chinese provinces collected and sorted out by the authors. It intends to disclose the features and differences of Chinese and American rural

design guidelines via the induction of guidance and control factors and the classified comparison of the guidelines, and to compare the guideline-making procedures and application mechanisms between the Chinese and American rural design guidelines under the different circumstances of rural development, in order to offer effective references for rural development practices and studies in different countries.

K4002 Presentation 11 (18:20~18:35)

Model for the Location of Transfer Hub in Clustered Cities

Ren Qi-liang
Chongqing Jiaotong University, China

Abstract- The location method about transfer hub in clustered city is different from the method in ring type city because the different layout of the land in the two type cities. In this paper, the defect about the one element analytic model method and the multivariate optimisation analysis model produce unsuitable result when used for location of transfer hub in clustered cities is pointed out, and the location of transfer hub in clustered cities is supposed as location of semidefinite form, the bilevel programming model for the location of transfer hub in clustered cities is built based on the land condition and the transportation condition, and the Interactive relationship between the distribution of transfer hub and traffic network and traffic flow, the solve step is given, and the example about the two clusters of one clustered cities is gave to test and verify the model，the result make clear that the model can supply theoretical support for the location of transfer hub in clustered cities.

K0026 Presentation 12 (18:35~18:50)

Experimental Investigation of Four-Point Flexural Behavior of Textile Reinforcement in Geopolymer Mortar

Hiep Le Chi, Petr Louda
Department of Material Engineering, Technical, University of Liberec, Czech Republic

Abstract- This paper describes an investigation of four-point flexural behavior of geopolymer composite specimens which made of textile reinforced geopolymer mortar. The two different types of mesh (basalt and carbon mesh) and their various aperture sizes were used as reinforcement. In this experimental work, only two mesh layers (for each type of textile) reinforced in geopolymer mortar are considered. All 21 plate specimens including reference specimens, each of size 360x180x20 mm3, have been tested for four-point bending strength. Besides that, 15 samples with dimension 30x30x150 mm3 and 15 samples of diameter size 45 mm x length 90 mm have been measured for evaluating the mechanical properties of geopolymer mortar matrix. The results have shown that geopolymer composite specimens with carbon meshes have both the flexural strength and deflection higher than those with basalt meshes. Besides, the decrease of aperture size of mesh improves significantly the flexural strength due to increase specified number of yarns.

Session 5

Afternoon, June 21, 2018 (Thursday)
Time: 15:50~18:20
Venue: C223
Session 5 10 Presentations-Topic: "Environmental and Chemical Engineering"
Session Chair: Assoc. Prof. Vincenzo Torretta

T0023 Presentation 1 (15:50~16:05)

A preliminary study on application of MBR+NF/RO (Membrane Bio-Reactor + nanofiltration/reverse osmosis) combination process for landfill leachate treatment in China

Wu Yuhao
Taiyuan University of Technology, Taiyuan, Shanxi, China

Abstract- Landfill leachate involves high concentrations of organic compounds, ammonia nitrogen, heavy metals and other complex components. Hence, it is very difficult to treat using conventional biological processes alone. This research is a preliminary literature review on using MBR+NF/RO combination process to achieve purification of landfill leachate in China. MBR+NF/RO process is a combination of biological and physico-chemical technology, including MBR system, nanofiltration and reverse osmosis devices. The study found that, the benefit of a complementary combination of MBR and NF/RO process with respect to removal of ammonia nitrogen, trace organic and heavy metal ions appears quite intuitive. And this promising treatment has developed rapidly in China in last few decades. In this paper, representative project examples in China were selected for review. Mechanism and influencing factors of MBR+NF/RO process in China in the past decades will be reviewed and recommendations will be given for the future development of Chinese MBR+NF/RO process.

T0035 Presentation 2 (16:05~16:20)

Low cost and long durability material for water treatment: Titania-coated cement

MENNAD Abdelkader and BOUTRA Belgassim
Centre De Developpement Des Energies Renouvelables, Cder, Bou-Ismail, Tipaza, Algeria

Abstract- Primary studies have been carried out on titanium dioxide powder, and revealed the efficient photocatalytic property of this material. More techniques have been developed to deposit the titanium dioxide particles onto a substrate, thus preserving from any further filtration after a water treatment. White cement has been used, as both a binder and a substrate, to deposit onto it titanium dioxide powder and to carry out the photodegradation of the tartrazine in an aqueous solution. The experiment has been conducted into a photocatalytic reactor designed and registered as a prototype patent. The complete photodegradation of the tartrazine molecule occurs with the same way as observed with the titanium dioxide powder in the aqueous solution of tartrazine. The same catalytic material of the titania-coated cement

has been submitted for a series of the photocatalytic degradation tests of the tartrazine molecule and remained still active and comparable to those observed during the first reaction tests.

T1009-a Presentation 3 (16:20~16:35)

Copper Ion Inhibition on Phenol Oxidation by Manganese Dioxide: The XPS and XAFS Studies

Jing Jiang, Anfei He, and G. Daniel Sheng
Suzhou University of Science and Technology, Suzhou, Jiangsu, China

Abstract- Metal-organic contamination is the most common existence in pollution systems. It is of great significance to determine the interaction between metals and organic pollutants during contaminant removal. Due to their high redox potential, low point of zero charge, and high surface area, manganese oxides play significant roles in the adsorption of heavy metals and oxidation of organic pollutants. This work examined the effects of copper ions on phenol oxidation by manganese dioxides. XPS (X-ray Photoelectron Spectroscopy) and XAFS (X-ray Absorption Fine Structure) were used to elucidate the underlying mechanism. Coexisting copper ions inhibited phenol oxidation by MnO_2 and the inhibition extent increased with copper adsorption on MnO_2. Over the copper concentration range examined, the relationship between phenol oxidation rate constant (K) and copper adsorption amount (q) consisted of two distinct linear segments, with turning point at q of about 0.6 mmol/g. The K decreased more rapidly with increasing copper adsorption over its lower range. The K further decreased comparatively more slowly thereafter at higher copper adsorption. XPS and XAFS analyses showed that at low copper adsorption, Cu-O bond formed, thus effectively deactivating the oxidative sites of MnO_2. At higher adsorption amount, copper hydroxides additionally formed, covering the active sites. The coverage was not specific, which led to relatively low inhibition efficiency. Thus, both copper adsorption amount and species determined its inhibition efficiency on phenol oxidation by manganese dioxide.

T2004 Presentation 4 (16:35~16:50)

Optimization of heavy metal removal by sulfate reducing bacteria in a high concentration Zn-fed fixed bed bioreactor using Plackett Burman Design experiments

Qiyuan Gu, Xinglan Cui, Xingyu Liu, He Shang and Jiankang Wen
GRIMAT Engineering Institute Co., Ltd. (GRIMAT), Beijing,China

Abstract- This study evaluated the combined effect of six processing factors on Zn, Cd removal and sulfate reducing by sulfate reducing bacteria in a high concentration Zn-fed fixed bed bioreactor. Statistically valid Plackett Burman design of experiments was employed to carry out this study. The results obtained showed a high removal of Zn (99.63%), Cd (99.73%) at a maximum influent Zn concentration of 320 mg/L. Analysis of variance (ANOVA) of Zn and Cd removal revealed that the effect due to glycerol dosage and reflux ratio were highly significant (P value < 0.05). To establish the role of sulfate reducing bacteria (SRB) in the metal removal process, the characteristics of microbial community in fixed bed bioreactor was analyzed by High-throughput Sequencing during the steady operational process. The results obtained shows that the percentage of the dominant sulfate reducing

bacteria in the sludge, such as *Desulfovibrio*, could reach 45.7%. Qualitative EDS analysis of the precipitate was performed. The results revealed that the precipitates as ZnS were confirmed by the EDS spectrum with strong peaks of zinc and sulfur.

T0018 Presentation 5 (16:50~17:05)

Characterization and Evaluation Aspects of a Mine Tailing in Gumushane, Turkey

E Sayilgan and G Karacan
Suleyman Demirel University, Isparta, Turkey

Abstract- Mining activities have contaminated the surrounding areas, downstream areas, soils, and waters through acid mine drainage, mine tailing, and waste rocks. Mine tailings have various dissolved metals and other pollutants. It is very important to determine the contents of mine tailings before selecting the appropriate treatment method. In this study, we investigated the characterization and metal contents of a mine tailing sample provided by a Mining Waste Corporation, in Gumushane/Turkey. The XRD analysis showed that the sample mainly consisted of dolomite and small portion of lead oxide, magnesium zinc oxide and aluminum oxide. According to the ICP results, the sample contains 170,000 mg/kg calcium, 86,300 mg/kg iron, 91,500 mg/kg magnesium, 20,600 mg/kg manganese, and 95,200 mg/kg sulphur. It may be harmful to discharge this waste to directly to the landfill, so an appropriate treatment method must applied before the discharged this waste.

T0045 Presentation 6 (17:05~17:20)

Environmentally Friendly Fuel by n-Heptane Isomerization: Kinetics of Catalyst Deactivation

MR Usman and A Mateen
Sultan Qaboos University, Muscat 123, Oman

Abstract- Stringent environmental regulations demand reduced amounts of aromatics in a gasoline fuel. The aromatics have high octane rating and therefore by removing them from a gasoline fuel substantially decreases the quality of the gasoline. One way to improve the octane rating of heavy normal alkanes present in heavy naphtha, without converting them into aromatics, is to isomerize them over an acidic catalyst. Zeolites are acidic catalysts that are highly efficient for the isomerization reactions. In the present study, n-heptane is taken as a model component of heavy naphtha and kinetics of the deactivation of different Y zeolite catalysts during the hydroisomerization reaction is studied. Various deactivation rate laws are tested against the experimental data and the best-fit rate law is worked out. Relatively low activation energies for the deactivation process are obtained showing temperature has little effect on the rate of deactivation for the conditions studied in the present work.

T0053-a Presentation 7 (17:20~17:35)

Influence Of Nature And Acid Concentration On Na^+ Transfer Across CTA/PVP/PASA Membranes

Sofiane Bensaadi and **Mourad Amara**
USTHB University, Algiers, Algeria

Abstract- The influence of nature and acid concentration on Na^+ transfer across the

CTA/PVP/PASA membrane was studied in this work. Cellulose triacetate-based (CTA) membrane has been synthetized by solvent evaporation technique. Polyvinylpyrrolidone (PVP) and polyanetholsulfonique acid (PASA) with the same concentration were added to CTA Chloroform solution. The polymers mixture dissolved in chloroform was poured onto a glass plate. Then, the obtained thin film after solvent evaporation was characterized by Fourier Transform infrared spectroscopy. The obtained results showed that all the maximum values extracted from the spectra of the CTA, PVP and PASA as references are present in the modified membrane spectra, we found also the same radicals. The membrane was placed between two compartments of Dialysis cell. The first compartment, noted feed compartment, contains Na^+ solution; the second one, noted receiving compartment, contains different kind of acid solution under different concentration. It is found that the best Na^+ transfer efficiency is obtained in the presence of HCl with a concentration of 0.5 N in the receiving compartment, it is in the order of 43.5%. A low transfer efficiency are obtained when H_2SO_4 and H_3PO_4 are present in the receiving compartment. They are in the order of 4% and 1.5% respectively.

T0083 Presentation 8 (17:35~17:50)

Study of molybdenum extraction from alkali roasted and acid leaching of ferro-molybdenum slag by using TOA and TBP

Wei-Sheng Chen, **Wen-Cheng Liang** and Cheng-Han Lee
National Cheng Kung University, Taiwan

Abstract- Solvent extraction of molybdenum (VI) from alkali roasted and acid leaching of ferro-molybdenum slag by using TOA and TBP as extractants was investigated. In this study, ferro-molybdenum slags contain about 1 wt% Mo. Before Mo solvent extraction, Mo slags were roasted by sodium hydroxide under 8:1 NaOH–slag mass ratio and 700 ◦C for 2hr produced 99.5% molybdenum leaching efficiency by sulfuric acid. In strong sulfuric acidity media (pH 1-2), Mo (VI) form MoO_4^{2-}, which are extracted by amine effectively. In solvent experiments, the organic phase is composed of TOA as extractant, TBP as modifier and kerosene as diluent. The effect of solvent extraction efficiency on different parameters such as pH and TOA/TBP concentrations. The result indicated the process was an effective method to separate molybdenum ions from high-impurity ferro-molybdenum slag.

T1003 Presentation 9 (17:50~18:05)

A study on an absorption refrigeration cycle by exergy analysis approach

Soheil Mohtaram, Wen Chen and Ji Lin
Hohai University, Nanjing, Jiangsu, China

Abstract- In this study, an absorption refrigeration cycle with the working fluid of water-lithium bromide is considered. The needful energy for generator is supplied by the steam at 100 ℃ and in one atmospheric pressure. The exergy analysis is conducted on the whole cycle and it is calculated based on the first and the second laws of thermodynamics. Various components are compared in terms of thermodynamic efficiency. Finally the coefficient of the mentioned cycle is obtained. According to the simulation results, the highest rate of exergy destruction is in the absorber, and it is equal to 35.87 % of the destruction and

the main cause of this irreversibility is heat transfer with the high-temperature difference. To improve this, we should increase heat exchange and then reduce the temperature difference. For the system performance improvement, particular attention should be paid to this part to reduce the outlet exergy.

T4002 Presentation 10 (18:05~18:20)

Modelling and Simulation of Nutrient Release from Neem (Azadirachta Indica) Oil Coated Urea

Shiv Om Meena, **Dr. Manish Vashishtha**, Ankush Meena
Malaviya National Institute of Technology, Jaipur, India

Abstract- Urea is an important Nitrogenous fertilizer. However, uncoated Urea when applied to crops is prone to nutrient losses due to run off, volatilisation and leaching. Answer to this problem lies in application of controlled release urea which plays a dual role of enhancing nitrogen use efficiency by plants leading to improved crop yields and also controls environmental pollution by reducing hazardous gaseous emissions and water eutrophication. The present study aims to model and simulate the nutrient release from urea coated with Neem (Azadirachta indica) oil coating (NCU) unveiling the three stages of nutrient release as explained in literature for other coated fertilizers. Multi diffusion model is developed for multilayer including the Neem Oil coating, water domain and couples the Finite element approximation with 2D geometry, to improve the accuracy of simulation urea diffusivity in water is taken as a function of its concentration. The simulation results agree well with the experimental data with standard error of estimate varying from 0.016 to 0.023. The model not only predicted nutrient release from NCU but also described the internal release mechanism from the core to coating interface and coating interface to water environment. The model was also validated with experimental results for urea coated with other materials also differing from NCU in core and coating thickness.

Poster Session

Afternoon, June 21, 2018 (Thursday)
Time: 15:50~18:50
Venue: C219
14 Poster presentations

T0051 Poster Presentation 1

Biodiesel production by methanolysis of rapeseed oil by using Li/ZnO as a catalyst

J. M. Encinar, J. F. González, N. Sánchez and S. Nogales
Extremadura University, Badajoz, Spain

Abstract- The aim of this research work was the production of biodiesel from rapeseed oil methanolysis, by using Li impregnated ZnO as an heterogeneous catalyst. With the aim of

determining the optimum conditions of the process, the influence of some operating variables was studied, such as the stirring rate and the amount of catalyst. Also, some variables concerning the catalyst preparation were considered, such as the activation temperature or the amount of impregnated active phase. The experimental facility used had a 500-mL flat bottom flask with three necks. The condenser (to avoid methanol loss) was connected to the central neck, whereas the remainders were used to connect a temperature probe and the sample collection system. In order to follow the kinetics of the transesterification process, some fatty acid methyl esters such as palmitic, palmitoleic, stearic, oleic, linoleic, linolenic and erucic acid were analyzed at different reaction times by gas chromatography (UNE EN 14103). Finally, in order to compare the results with conventional diesel, the characterization of the biodiesel obtained was carried out, according to UNE standards, analyzing density, viscosity, cold filter plugging point, flash and combustion points, distillation characteristics, cetane number, and acidity, iodine and saponification values.

T0052 Poster Presentation 2

Glycerol reuse for obtaining synthesis gas through steam reforming

J. M. Encinar, **J. F. González**, N. Sánchez and S. Nogales
Extremadura University, Badajoz, Spain

Abstract- Glycerol is generated in biodiesel production. Due to its overproduction, it is necessary to find new applications for glycerol. In this work glycerol underwent steam reforming to obtain synthesis gas, using α-alumina as a filling material, and two cylindrical reactors of 5.2 cm of diameter and 30 cm long, installed in series, and controlling temperature and carrier gas flow. There was also a condensation system for the condensable products and a sample collection system for the gas produced.
The study of the main variables for this process (particle size, temperature, total flow, water/carbon ratio and nitrogen flow) was carried out. The decrease in particle size, as well as the increase in temperature, had positive effects on synthesis gas production. The total flow of the feed mixture and the water/carbon molar ratio should be regulated, establishing a balance between both parameters. Concerning the nitrogen flow, there was an optimum point from which lower or higher flows worsened the results. Finally, the continuous use of the filling material affected the results, proving that the flow of gas produced decreased over time, and its composition became poorer in hydrogen, reaching a stationary regime where the synthesis gas had similar CO and H_2 levels.

T0055-a Poster Presentation 3

Combination of various solid wastes with fragmented limestone as filler for constructed wetlands used for wastewater treatment

Dina Mateus, Nuno Graça, Ana Alves and Henrique Pinho
Instituto Politécnico de Tomar, Estrada da Serra, Quinta do Contador, 2300-313 Tomar, Portugal

Abstract- Constructed wetlands (CWs) are a green technology for wastewater remediation, engineered to simulate natural wetlands with an improved control over the treatment capabilities. This study aims to contribute to the development of an eco-efficient design

through the concept of circular economy and the use of waste to treat waste. To evaluate the combined capability of five waste materials to wastewater treatment, sets of unplanted lab-scale CWs were established. A reference set was filled only with limestone fragments (LFO), the remaining four sets were filled with three layers, a bottom and top layer of limestone fragments and inner layer of each of the evaluated waste material: cork granulate (LCG CW); snail shells (LSS CW); brick fragments (LBF CW); coal slag (LCS CW). The CWs were operated in a discontinuous mode, fed with a low-strength wastewater, with a contact time of six days and a one-day rest. The highest removal rate was obtained for the LCS CW and the lowest for the control LFO CW, indicating that all the waste materials are good CW fillers for the removal of oxidable compounds. Removal percentages for total nitrogen were 84.8±0.1, 82.2±0.3, 75.1±0,1, 55.4.0±0.3 and 43.6±2.0 for the LBF, LCS, LCG, LFO and LSS CWs, respectively. The highest removal rates were obtained for the LBF CW and the lowest for the LSS CW. Total phosphorus removal percentages of 91.8±0.1, 86.6±0.3, 76.5±2.5, 76.5±0.1 and 11.8±1.9 were achieved for the LFO, LCS, LBF, LCG and LSS CWs, respectively. It was concluded that these layer-packed solid waste combination fillings are adequate in improving COD removal in limestone based CWs, and that all but the limestone-snail shells filling have a very good performance for total nitrogen and total phosphorus removal from wastewater. This innovative combination of different waste materials can be tuned to improve CW performance for different types of wastewater, while simultaneously contributing to the valorization of solid waste.

T0025 Poster Presentation 4

Fraction transformation of Cr in *Leersia hexandra* Swartz constructed wetland

Jiansheng Wang, **Xingfeng Zhang**, Fengjiao Gao and Masafumi Goto
Guilin University of Technology Guilin, China

Abstract- In this paper, the fraction distribution of Cr contaminated wastewater were treated by *Leersia hexandra* Swartz constructed wetlands. The results showed that with the Cr-contaminated wastewater enter the wetland, the wastewaters transformed to different forms respectively, and residuals fraction mainly were existed in the matrix and in plant bodies. The residuals present in all zones turned up at first and then decreased; the reducible fraction showed a gradual decreased in the wetland; and the weak acid extractable did not change much. The fraction of Cr in *L. hexandra* roots increased first and then decreased in different zone, of which the most obvious changes were in weak acid extractable fraction. The fraction of weak acid extractable and residue in the stems of *L. hexandra* increased first and then decreased in different zone, while the ethanol fraction decreased gradually. Residue fraction and ethanol fraction in different zone gradually decreased in the *L. hexandra* leaves, while the weak acid extractable showed the first increase and then decrease.

T1012 Poster Presentation 5

Performance Comparison of Coagulation, Ultrafiltration and Combined Coagulation and Ultrafiltration for Water Reclamation

J. Yimratanabovorn, W. Wonglertarak, O. Rungrueang, C. Hirunteeyakul and B. Wichitsathein
Suranaree University of Technology, Muang, Nakhon-Ratchasima, Thailand

Abstract- Reclaimed water offers prospects as an alternative water resource. Many technologies have been developed to treat reclaimed wastewater technologies. The membrane technology is considered one of the most effective water treatment technologies for water reclamation. Ultrafiltration membranes are particularly effective at removing microorganisms in wastewater, particularly protozoa. Coagulation-flocculation is a feasible process to reclaim water and widely used as a pre-treatment. The aim of this study is to investigate the performance of water reclamations processes: the single coagulation-flocculation, the single ultrafiltration and the combined coagulation-flocculation and ultrafiltration. The pilot scale laboratories of each process was operated and have been characterized in order to evaluate the performance. The results of combined CF+UF process had the highest performance of COD, turbidity and color removal efficiencies than the single CF process and the single UF process. The combination of CF+UF helps to improve the process performance and enhanced COD, turbidity and color removal efficiencies of combined processes. The reclaimed water from combined CF+UF process can be used for vehicle washing, urban landscaping and toilet flushing purposes. In addition, can be used as water supply. However, to use instead of water supply should be evaluated the bacteria indicators, hygienic safety and economic feasibility.

T1019 Poster Presentation 6

Evaluation of efficiency and biodegradability of lubricant oil treated by sequencing batch reactor (SBR)

Boonchai Wichitsathian and Watcharapol Wonglertarak
Suranaree University of Technology, Nakhon Ratchasima, Thailand

Abstract- Oily wastewater is one of the most concerned pollution sources due to its consisting of toxic substances such as phenols, petroleum hydrocarbons, and polyaromatic hydrocarbons. Those substances are also inhibitory to plant and animal growth as well as mutagenic and carcinogenic to human being. Such kind of wastewater is mainly originated from crude oil production, oil refinery, petrochemical industry, lubricant and car washing. The purpose of this study was to investigate the effect of lubricant oil concentration normally used in a gas station on the performance of SBR. The experiment was performed by varying concentration of lubricant oil from 50 to500 mg/L in SBR with HRT 24 hrs. The results indicated that the effective removal of COD was in the range of 84-87%. The oil removal efficiency was found to be in the range of 51-82%. Considering, effluent of SBR system at HRT 24 hours with the Readily biodegradable, the value percentage increase of 62.00%, 57.79%, 60.54%, 54.53%, 41.79% and 36.03%, respectively, and Slowly biodegradable hydrolysis into Readily biodegradable was to increases.

T2005-a Poster Presentation 7

Monodispersed Core-Shell SiO_2@Cu Nanoparticles : synthesis and characterization

Imane Ghiat, **Adel Saadi** and Amel Boudjemaa
USTHB University, Algiers. Algeria

Abstract- Nowadays, various metal nanoparticles-based materials, such as Au, Pd, Pt, Ag, and Ru have been investigated extensively, wherein Cu-based catalysts have been regarded as the

most promising candidates because of their low cost and extensive supply. Compared to other noble metal catalysts, Cu nanoparticle-based materials exhibited excellent catalytic activity in hydrogenation and reduction reactions.

The preparation of metal nanoparticles (NPs) with controlled shape and size is of great interest in many fields, including electronics, biological labeling, magnetic devices, information storage, and especially catalysis. The intrinsic properties of metal NPs depend mainly on their size, shape, composition, crystallinity, and structure, and various efforts to tailor these properties have been made. In catalytic applications, small particle size and good dispersion of the catalytic NPs in general lead to high activity due to the high ratio of surface to bulk atoms

For use as catalysts, metal NPs can be suspended in solution or supported on a solid. For practical applications, supported metal NPs on mostly porous supports are preferred. Among the materials used for supporting metal NPs, ordered mesoporous silicas have received a lot of attention due to their straightforward synthesis and highly defined textural properties, such as high surface area, ordered pore structure, and controllable pore size.

In this work SiO_2@ Cu nanospheres were prepared by hydrothermal method with SiO_2 and copper salt as precursors (copper weight of 5 and 10%). The samples were characterized by x-ray diffraction, field-emission scanning electron microscopy, Fourier transform infrared spectroscopy, nitrogen adsorption, x-ray photoelectron spectroscopy, and their catalytic properties were evaluated in the degradation of 4 nitro phenol. The synthesized materials were composed of a SiO_2 shell and Cu nanosheets on the surface. The material exhibited a band gap of 1.44 eV. The high specific surface areas and porous surfaces of the composite particles are suitable for various applications, including adsorption of pollutants, chemical separation, and water purification. XRD patterns of the composite powder show an amorphous structure with poor crystallinity. FTIR prove the presence of copper in the silica matrix which agrees with XRD. EDX results suggest the presence of Si and Oxygen elements, confirming the formation of SiO_2 particles. The morphology of the samples is examined by SEM and show microspheres with a diameter of 300 nm.

K1012 Poster Presentation 8

Geometrically Nonlinear Stability of Curved Continuous Rigid Frame Bridges with Initial High Pier Imperfections at Largest Cantilever Stage

Guohua Song, Minghui Li, and Delu Che
School of Civil Engineering, Zhengzhou Univeisity, Zhenghzou, China,

Abstract- In this study, we investigated the geometrically nonlinear stability (GNS) of curved continuous rigid frame bridges (CRFB) with initial high pier imperfections at the largest cantilever stage. The stability safety factors were computed and compared for models in an ideal state, initial material imperfection state, initial tilt sate, initial bend state, or with different pier types, respectively. The stability safety factors decrease when geometrically nonlinear effects are considered, and decrease to greater extent when the initial material imperfection appears in the middle and lower portions of the pier. A cross section in the double-limb piers causes even greater decrease in stability. Initial tilt and initial bend also decrease stability, especially the latter – in practice, it is crucial to reduce initial bend as much as possible to ensure a safe structure. These factors affect stability to nearly the same extent

regardless of whether a double-limb pier or single-limb pier is utilized. Taken together, these results suggest that GNS analysis is necessary to fully comprehensively assess the safety of a curved CRFB with high piers.

T1017 Poster Presentation 9

Development of Bicycle Transport in the City of Sofia as Part of the Concept for Stable Urban Mobility

Svetla Tzvetkova
University of National and World Economy, Sofia, Bulgaria

Abstract- The concept for Stable Urban Mobility, included in the European Commission's Green Papter titled "Towards a New Urban Mobility Culture", consists of encouraging the combination of different types of public transport with different types of individual transport. The new concept for urban mobility also suggests reaching common goals for economic prosperity and recognizing the right to mobility by managing the quality of life and protecting the environment. The Green Paper states the following: "Encouraging walking, cycling and constructing the appropriate infrastructure" which makes it clear that bicycle transport and its related infrastructure are an inseparable part of stable urban mobility. However, the city of Sofia presently does not have a developed bicycle infrastructure. Incorporating bicycle traffic within the city's transport framework is not only necessary, it has to become a part of the priorities of the city's transport system. The purpose of the report is to substantiate the necessity for the development of bicycle transport in Sofia and to indicate the guidelines for its future development. The more stably built an urban transport system is and the more corresponding it is to citizens' needs and to the problems of modern urbanized environments, the higher the guarantees are for the city's stable development in society's favor.

T0074 Poster Presentation 10

Preliminary Study on Thermodynamic Urban Design Based on Prototype Research of Tropical Rainforest

FAN Yating
D.Arch. University of Hawaii at Manoa, USA

Abstract- Under the background of contemporary global design and all-sided sustainable development, traditional architectural design methods and the autonomy of architecture are being challenged. Energy and thermodynamics now provides a more complete perspective on the future based on archeology and science. Before attempting to find a city paradigm for Singapore, a tropical island nation facing an energy crisis, this article, from the perspective of natural learning, examines the ecosystem of tropical rainforests, conducting the prototype analysis with four aspects, climate and microclimate, vertical structure, energy flow and ecological community. Correspondingly, four important strategies that run throughout the thermodynamic urban paradigm design are summarized: climate adaptation, self-organization, community system and regeneration succession. Afterwards to plus the further design from four different levels: region, city, architecture and experience, this article is to explore new thermodynamic urban paradigm.

T0086 Poster Presentation 11

Study on the Short-term Treatment Technology of Landfill Leachate

Jin Li, Fengnan Liu, Feng Ding, Xueren Dong, Qinqin Xu
University of Jinan, Shandong, China

Abstract- Domestic garbage is mainly treated by sanitary landfill.The main characteristics of landfill leachate produced in the sanitary landfill process are high concentration of COD and BOD, high ammonia nitrogen content,high levels of refractory organics,heavy metal ions, poor biodegradability, unstable water quality, difficult handling and so on. If the treatment is not carried out, the environment will be severely damaged. According to the needs of the project, this paper proposes a set of short-term landfill leachate treatment process, which involves ozone oxidation, internal electrolytic oxidation technology, coagulation precipitation, deep oxidation of the chain reaction, microwave field catalytic oxidation, adsorption and other treatment processes. Eliminating the biochemical process, the entire process flow is relatively short, and the processing efficiency is high. And the use of PLC-based control system to achieve automatic control of landfill leachate treatment. Since the leachate water quality has a wide range of variation, the PID control method based on BP neural network adaptive control strategy is adopted to achieve on-line adjustment of PID control parameters. The final effluent water quality can meet the emission standards.

T0099 Poster Presentation 12

A Study on Daylighting Design of Urban Mid-Rise Housing from the Perspective of Carbon Emission Reduction Effect: Shanghai, China

Y Huang, **L Li** and C E Llewellyn
Tongji University, Shanghai, China

Abstract- Under the circumstance of rapid development, the contradiction and balance between energy consumption, carbon emission and urban living environment are increasingly become one of the problems to be solved in contemporary China. Housing has demonstrated tremendous potential to play a major role in the reduction of carbon emission, to gain a balance between reducing carbon emission and meeting increasing demand. Good daylighting is irreplaceable in improving the quality of housing and meeting the daily physiological and psychological needs of the residents. Thus, it is necessary and insightful to evaluate daylighting of housing from the perspective of carbon emission reduction. In this paper, three design control factors of window height, window/wall ratio and aspect ratio of window are studied. Several preliminary design optimization strategies based on residential lighting in Shanghai are proposed.

T0044 Poster Presentation 13

Insecticide usage in lotus-fish farming and its impact on fish culture and grower health

Suvarin Bumroongsook
King Mongkut’s Institute of Technology Ladkrabang, Bangkok, Thailand

Abstract—Insect pest is a major problem of lotus flower production for local markets and

export. Lotus growers inappropriately use high quantity of toxic insecticides to control insect pest. Insecticides are applied all over the lotus farming and the chemical substances are not limited to lotus flowers but they leach down to the water reservoir affects fish and other nontarget living organisms in water and the environment. Therefore, the survey of insecticides usage and related information for lotus-fish farming in 3 different provinces: Chachoengsao, Suphanburi and Nakhonpathom was conducted. The result showed most growers had an elementary school certificate while the rest held a secondary school certificate. The important insect pest of lotus are thrips *(Frankliniella schultzei)* and common cutworm (*Spodoptera litura).* Lotus growers preferred organophosphate insecticides the most, followed by the avermectin group. Most growers from Chachoengsao (89.9%), Nakhonpathom (84.1%) and Suphanburi (77.4%) had insecticide application regularly. Decontamination of insecticidal residue on lotus flowers after harvest could be done by using flower dipping in water before distribution. Concerning over fish culture in lotus-fish farming, growers used the insecticide that had least effect on fish. However, the chemical application might cause the slow growth of fish. None of fish kill occurred due to insecticide application for insect control in lotus-fish farming. Repeated exposure to insecticide during application causes health problems to the growers.

T0091 Poster Presentation 14

Iodide removal by use of Ag-modified natural zeolites

A. V. Korobeinyk, A. R. Satayeva, A. N. Chinakulova and V. J. Inglezakis
Nazarbayev University, Astana, Akmola, Kazakhstan

Abstract—In the present work Ukrainian clinoptilolite was modified with Ag and applied for the removal of iodide from aqueous solutions. The effect of three different modifications was studied, one resulting in an Ag^+ ion exchanged form, and two resulting in zeolites decorated with silver oxide and zero valent metallic nanoparticles. The results indicated the strong potential affinity of the Ag-modified zeolite materials towards iodide.

Dinner	
19:00	**Restaurant**

List of Listeners

Name	Affiliation
G. Daniel Sheng	Tongji University, Shanghai, China
Andrew Konarev	AES PTY LTD, Sydney, Australia
Anna Konareva	AES PTY LTD, Sydney, Australia
Vincenzo Torretta	Insubria University, Varese, Italy
CHIKE KELVIN UMEMEZIA	Ministry of Niger Delta Affairs, Nigeria
SungWook Hwang	ISDongseo, South Korea
YoungShik, Park	ISDongseo, South Korea
Nawaf Aldhfiri	State Audit Bureau, Kuwait

Visit and Tour

June 22, 2018 (Friday)
9:00--17:00

9:00: Assemble at the outside of Faculty of Civil Engineering, Czech Technical University in Prague

9:30—11:30 Visiting the Faculty of Civil Engineering, Czech Technical University in Prague

11:30—13:00 Having lunch

13:00—17:00 City sighting in Prague city.

Prague Castle

Prague Castle (Czech: Pražský hrad; [ˈpraʃskiː ˈɦrat]) is a castle complex in Prague, Czech Republic, dating from the 9th century. It is the official office of the President of the Czech Republic. The castle was a seat of power for kings of Bohemia, Holy Roman emperors, and presidents of Czechoslovakia. The Bohemian Crown Jewels are kept within a hidden room inside it.

Prague Old Town Square

Old Town Square is a historic square in the Old Town quarter of Prague, the capital of the Czech Republic. It is located between Wenceslas Square and the Charles Bridge.

The square features various architectural styles including the Gothic Church of Our Lady before Týn, which has been the main church of this part of the city since the 14th century; the church's towers are 80 m high. Prague Orloj is a medieval astronomical clocklocated on the Old Town Hall. The clock was first installed in 1410, making it the third-oldest astronomical clock in the world and the oldest one still in operation. The Baroque St. Nicholas Church is another church located in the square, while the tower of the Old Town Hall offers a panoramic view of Old Town. An art museum of the Czech National Gallery is located in Kinský Palace.

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Did the conference fulfill your reason for attending?	Yes– Absolutely □ Yes- But not to my full extent □ No□ (If "No", please tell us the main reason)
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Any Other Suggestions/Comments	

Thank you for taking time to participate in this conference evaluation. Your comments will enable us to execute future conferences better and tailor them to your needs!