

# 2019 9th International Conference on Environment and Industrial Innovation (ICEII 2019)

**April 25-28, 2019**

**Bangkok, Thailand**



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# Conference Venue

## AVANI ATRIUM BANGKOK

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- 40-minute drive to Suvarnabhumi and Don Mueang airports
- 5-minute walk to Prasanmit boat pier
- 7-minute walk to Phetchaburi subway station
- 10-minute walk to Makkasan Airport Rail Link station

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## Bangkok Conference Introductions

Welcome to 2019 HKCBEEES Bangkok conference. This conference is organized by HKCBEEES. The objective of the Bangkok conference is to bring together innovative academics and industrial experts in the field of Environment and Industrial Innovation to a common forum  
**2019 9th International Conference on Environment and Industrial Innovation (ICEII 2019)**

**Accepted papers will be published in the following Journal:**



**International Journal of Environmental Science and Development (IJESD) (ISSN: 2010-0264)**, and all papers will be indexed by Scopus (Since 2019), Chemical Abstracts Services (CAS), CABI, Ulrich Periodicals Directory, Electronic Journals Library, Crossref, ProQuest.

Conference website and email: <http://www.iceii.org/>; [iceii@cbees.org](mailto:iceii@cbees.org)

# 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 **40** 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 Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on April 26 and April 27, 2019.

## Dress code

Please wear formal clothes or national representative of clothing.

# Keynote Speaker Introductions

## Keynote Speaker I



Prof. Chou Loke Ming

Tropical Marine Science Institute, National University of Singapore, Singapore

Dr. CHOU Loke Ming is Adjunct Research Professor at the Tropical Marine Science Institute, National University of Singapore. He obtained his PhD in Zoology from the University of Singapore in 1976. His research on coral reef ecology and integrated coastal management covers Southeast Asia. His current research focus is reef restoration and he is particularly interested in how corals can be re-established in the highly turbid conditions of rapidly developing coastal areas. He is an Honorary Fellow of the Singapore Institute of Biology and a Fellow of the Singapore National Academy of Science.



Topic: 'CORAL REEF RESTORATION AND HABITAT CREATION TO MITIGATE URBANISATION AND CLIMATE CHANGE IMPACTS'

*Abstract*—Intense urbanization since the 1960s has physically transformed Singapore's coastal environment with natural habitats displaced by human-engineered structures. Land reclamation has increased the size of the city state by 25% and seawalls line more than 60% of its coastline. Over 60% of Singapore's coral reefs have been lost to land reclamation leaving the remaining reefs exposed to increased sedimentation, which has restricted the active growth zone of corals to the upper six meters of the reef slope. Despite reduction of the coral growth zone, coral species richness has remained high at 255 and only two species have become locally extinct. Mass spawning of corals occur regularly during the April full moon and coral recruits have established on human-engineered coastal structures. These ecological processes indicate that reef ecosystem integrity has not been seriously impaired and that restoration, which can improve reef resilience against urbanization as well as climate change impacts, is relevant.

Past and present reef restoration initiatives in Singapore's sediment-challenged seas indicate that they can help to improve degraded coral reefs as well as establish new reef communities on extensively modified coastal areas. Restoration techniques must account for the high sediment environment, destabilized reef substrate, and change in biological community structure. It is necessary to investigate coral species dominance since this has shifted to favor those more tolerant of reduced light condition. Restoration can be initiated with the dominant species to stabilize the restoration site within the shortest time. Sloping hard substrates above the silt bottom reduce sediment accumulation and are more suitable for settling coral larvae or attached fragments. Coral nurseries comprising raised mesh-net platforms prevent sediment smothering and improves survival of coral fragments and juveniles.

Corals have also naturally recruited and developed on seawalls constructed in areas that did not previously support coral reef formation. Innovative design and engineering of structures can facilitate coral growth as sea level rises. Floating reefs and seawalls that incorporate terraced tidal pools can encourage continued growth and development of coral communities as urbanization pressure and climate change impact continue. Two approaches considered appropriate to restoring coral communities exposed to urbanization and climate change impact are 1) increase live coral cover and diversity of degraded reefs, and 2) create new reef communities in non-reef areas. Active restoration intervention is relevant to the enhancement of reef recovery and development of new coral community habitats in the changing coastal environment and will help to improve ecological sustainability of the urban seascape.

## Keynote Speaker II



Assoc. Prof. Baoping Cai  
China University of Petroleum

Baoping Cai is the associate professor/ PhD student supervisor of China University of Petroleum, the “Hong Kong Scholar” visiting researcher of City University of Hong Kong, and the visiting researcher of Norwegian University of Science and Technology. He is the director of experimental teaching center of mechanical engineering of China University of Petroleum.

He has published more than 100 journal and conference papers, and more than 60 papers are indexed by SCI. He has granted 40 China patents and 4 international patent. He has published 4 monographs. He has finished 11 projects as PI.

Now, he is the associate editor of IEEE Access (SCI journal) and Human-centric Computing and Information Sciences (SCI journal), the editorial board member of 3 journals, and the lead guest editor of 1 Journal. He has served as the general chair of 1 international conference, co-chair of 3 international conferences.

His research interests include development of subsea systems for oil and gas equipment, as well as the corresponding reliability engineering and fault diagnosis methodology.

Topic: ‘Development of Subsea Systems for Offshore Oil and Gas Equipmentd, with fault diagnosis issues’

*Abstract*—An extremely reliable remote control system for subsea blowout preventer stack is developed based on the off-the-shelf triple modular redundancy system. To meet a high reliability requirement, various redundancy techniques such as controller redundancy, bus redundancy and network redundancy are used to design the system hardware architecture. The control logic, human–machine interface graphical design and redundant databases are developed by using the off-the-shelf software. A series of experiments were performed in laboratory to test the subsea blowout preventer stack control system. Fault diagnosis is useful in helping technicians detect, isolate, and identify faults, and troubleshoot of offshore oil and gas equipment. Bayesian network (BN) is a probabilistic graphical model that effectively deals with various uncertainty problems. This model is increasingly utilized in fault diagnosis. Based on BN-based fault diagnosis presented, we identify few ongoing and upcoming research directions that are of interest to fault diagnosis researchers.



**Coffee Break & Group Photo Taking (April 26)**

**10:50~11:15**

## Keynote Speaker III



Prof. Koh Hock Lye  
Sunway University, Malaysia

H.L. Koh was born in Penang, Malaysia. He received his BSc from University of Malaya in 1970 and MA as well as PhD in mathematics in 1971 and 1976 respectively from University of Wisconsin, Madison, USA. He was the recipient of Oppenheim Prize of University of Malaysia and Fulbright Scholarship USA and DAAD Fellowship. He served as an Associate Member of the International Centre for Theoretical Physics (ICTP) from 1986 to 1992. He is currently a Professor at Sunway University Business School. He has served for 40 years in Universiti Sains Malaysia before continuing his research at Sunway University. His fields of specialization include environmental and ecological system modeling and simulations, integrated river basin management and modeling, numerical modeling of tsunami hazards and numerical simulation of dengue and H1N1 epidemics. Prof. Koh has many journal publications, notably in *Water Sciences & Technology*, *Environmental Monitoring and Assessment*, *Water Quality Research Journal of Canada*, *Pollution in the Urban Environment*, *Journal of Asian Earth Sciences*, *Ecosystems*, *Ecological Modelling*, *Landscape Ecology* and *Agricultural and Forest Meteorology*.

Topic: ‘Sustainability in Theory and in Practice: A Three-decade Reflection on Education for Sustainability’

*Abstract*—The Brundtland (1987) report calls for sustainability measures and actions that would ensure that the future generations would have the same access to the natural resources available to the current generations. The definitions of sustainability inherently consider human-nature relationship as a complex, interconnected and vulnerable system that connects current and future generations, in ways that are not yet clearly understood. The most acceptable interpretation mandates a balance between the three pillars of sustainability - environment, society and economics. Education for sustainability (EfS) aims to equip students and educators with core competences capable of (1) critical deep thinking to holistically address the complexities and uncertainties of the future and of (2) transforming society towards sustainability-led lifestyles. Literature review, however, indicated that most higher education institutes do not yet fully understand the true nature of sustainability challenges. This deficiency has created barrier to effective curriculum and pedagogy development that would (1) develop deep knowledge and skills, (2) cultivate spirituality for human-nature relationship and (3) promote strategy critical to sustainability. This presentation critically reflects on the complexity of sustainability concepts and practices over the past three decades.



<b>Lunch</b>	<b>12:00~13:30</b>
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## Invited Speaker



Dr. Shuo Wang

Hydroclimate Research Group at the Hong Kong Polytechnic University

Dr. Shuo Wang is a principle investigator in the Hydroclimate Research Group at the Hong Kong Polytechnic University. His research focuses on the high-resolution hydroclimate projection and the assessment of climate change impacts on natural and human systems. Dr. Wang received his Bachelor's degree (Hons) in Information Technology from Monash University, Australia in 2008. He received his Master's degree (2011) and Ph.D. (2015) in Environmental Systems Engineering from the University of Regina, Canada. Prior to joining the Hong Kong Polytechnic University, Dr. Wang was a Research Assistant Professor in the Department of Geosciences at Texas Tech University, USA. Dr. Wang has published more than 40 peer-reviewed journal articles with an h-index of 15 according to the ISI Web of Science database. He has been invited as reviewers for over 20 scientific journals, and has received Outstanding Reviewer Awards for Journal of Hydrology (Elsevier) and Ecological Indicators (Elsevier). Dr. Wang currently serves as an Associate Editor for Journal of Hydrology (Elsevier).

Topic: ‘Convection-permitting projections of future changes in hydroclimatic characteristics’

*Abstract*—Understanding future changes in hydroclimatic regimes (e.g., precipitation, temperature, relative humidity, evapotranspiration, streamflow, etc.) plays a crucial role in improving resilience and adaptation to climate-induced extreme events, such as droughts, floods, and heatwaves. Convection-permitting climate models with horizontal grid spacing of  $\leq 4$  km are recognized as a promising tool for producing reliable projections of future climate change, especially for improving the representation of precipitation associated with mesoscale convective systems. We develop high-resolution climate projections over Texas through convection-permitting climate simulations. Based on the projected climate information, we carry out probabilistic streamflow predictions for four major river basins which are the primary concern of the Texas Department of Agriculture and the Texas Water Development Board. In addition, we assess future changes in multivariate drought characteristics for the four major river basins over Texas, which provides meaningful insights into agricultural development and water resources planning in a changing climate. It is a first attempt to examine the hydrological response to climate change at a basin scale through the convection-permitting climate modeling. We will present the proposed methodologies and our significant findings as well as potential future directions to further improve the robustness of hydroclimatic projections.

## Brief Schedule for Conference

<b>Day 1</b>	<p><b>April 25 (Thursday)</b>      10:00~17:00  <b>Venue: AVANI ATRIUM BANGKOK (Lobby)</b>            (Add: 1880 Petchburi Road, Bangkok, Huay Kwang, Bangkok 10310 Thailand)            Participants Onsite Registration &amp; Conference Materials Collection &amp; Conference Reports</p>
<b>Day 2</b>	<p><b>April 26 (Friday)</b>      09:15~18:00  <b>Venue: Vivaldi (4th floor)</b>            (Add: 1880 Petchburi Road, Bangkok, Huay Kwang, Bangkok 10310 Thailand)            Participants Onsite Registration &amp; Conference Materials Collection &amp; Conference Reports</p>
	<p><b>Opening Remarks</b>      09:15~9:20            Prof. Koh Hock Lye            Sunway University, Malaysia  <b>Keynote Speech I</b>      09:20~10:05  <b>Topic: ‘CORAL REEF RESTORATION AND HABITAT CREATION TO MITIGATE URBANISATION AND CLIMATE CHANGE IMPACTS’</b>            (Prof. Chou Loke Ming, Tropical Marine Science Institute, National University of Singapore, Singapore)</p>
	<p><b>Keynote Speech II</b>      10:05~10:50  <b>Topic: ‘Development of Subsea Systems for Offshore Oil and Gas Equipmentd, with fault diagnosis issues’</b>            (Assoc. Prof. Baoping Cai, China University of Petroleum, China)</p>
	<p><b>Coffee Break &amp; Group Photo Taking</b>      10:50~11:15</p>
	<p><b>Keynote Speech III</b>      11:15~12:00  <b>Topic: ‘Sustainability in Theory and in Practice: A Three-decade Reflection on Education for Sustainability’</b>            (Prof. Koh Hock Lye, Sunway University, Malaysia)</p>
	<p><b>Lunch 12:00~13:30</b>  <b>Venue: Restaurant in the Hotel</b></p>
	<p><b>Invited Speech</b>      13:30~13:55  <b>Topic: ‘Convection-permitting projections of future changes in hydroclimatic characteristics’</b>            (Dr. Shuo Wang, Hydroclimate Research Group at the Hong Kong Polytechnic University)</p>



2019 HKCBEEES BANGKOK CONFERENCE

	<p><b>Session 1 13:55~15:55</b>  <b>Venue: Vivaldi (4th floor)</b>            8 presentations-Topic: “Renewable Energy Application”            Session Chair: Prof.Chia-Peng Chou and Dr. Shuo Wang</p>
	<p><b>Coffee Break 15:55~16:15</b></p>
	<p><b>Session 2 16:15~18:00</b>  <b>Venue: Vivaldi (4th floor)</b>            7 presentations-Topic: “Marine Ecology and Environment”            Session Chair: Assoc. Prof. Baoping Cai</p>
	<p><b>Poster Session: 09:15-18:00 Venue: Vivaldi (4th floor)</b></p>
	<p><b>Dinner 18:00</b></p>
<b>Day 3</b>	<p><b>April 27 (Saturday) 08:40~12:25</b>  <b>Venue: Vivaldi (4th floor)</b>            Participants Oral Presentations</p>
	<p><b>Session 3 08:40~10:40</b>  <b>Venue: Vivaldi (4th floor)</b>            8 presentations-Topic: “Ocean Engineering and Physics”            Session Chair: Prof. Chou Loke Ming</p>
	<p><b>Coffee Break 10:40~10:55</b></p>
	<p><b>Session 4 10:55~12:25</b>  <b>Venue: Vivaldi (4th floor)</b>            6 presentations-Topic: “Wastewater Treatment and Health”            Session Chair: Prof. Koh Hock Lye</p>
	<p><b>Lunch 12:25</b></p>
<b>Day 4</b>	<p><b>April 28, 2019(Sunday) 9:30~17:00</b>  <b>One Day Tour</b></p>

**Tips:** Please arrive at the conference to upload or copy PPT into the laptop room 10 minutes before the session begins.

**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 Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on April 26 and April 27.

# Session 1

**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.**

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0037-A Presentation 1 (13:55~14:10)

Assessing external benefits of increasing bioethanol consumption: A choice experiment study

**Jae-Shin Lee**, Ga-Eun Kim ,Seung-Hoon Yoo

Seoul National University of Science & Technology, South Korea

*Abstract*—The South Korean government is expanding the use of bioethanol in order to reduce CO<sub>2</sub> and air pollutants emissions. Bioethanol is an alternative transportation fuel source for gasoline and usually used as an additive for gasoline. This article aims to apply a choice experiment (CE) and evaluate the external benefits of increasing bioethanol consumption. The attributes considered are improvement in energy security, reduction of air pollutants emissions, mitigation of CO<sub>2</sub> emissions, and new job creation. This article utilized the mixed logit (ML) model not to make a restrictive independence from irrelevant alternatives (IIA) assumption, allowing for the preference heterogeneity and applied the Bayesian approach to overcome some complications involved in estimating the ML model of CE data from a survey of 600 South Korean people. The estimation results for ML model show that the MWTPs for a 1% decrease in crude oil imports, a 1% abatement of air pollutants emissions, a 1% decrease in reduction of CO<sub>2</sub> emissions in transportation sector, and 100 new jobs creation are obtained as KRW 2,131 (USD 2.00), 2,066 (1.94), 1,370 (1.29), and 970 (0.91) per household per annum, respectively. This information can offer some useful policy implications for increasing bioethanol consumption to policy-makers.

# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0051 Presentation 2 (14:10~14:25)

Stacking efficiency of terrestrial Plant-Microbial Fuel Cells growing *Ocimum basilicum* and *Origanum vulgare*

**Kristopher Ray S. Pamintuan**, Arnie Jantzen G. Ancheta, Shaina Marie T. Robles  
Mapua University, Manila, Philippines

*Abstract*—Plant-Microbial Fuel Cells (PMFCs) are an emerging type of renewable energy that generates an electric current through the consumption of rhizodeposits by exoelectrogenic bacteria that lives in the rhizosphere of the plant. This mutualistic behaviour can be exploited for power generation by strategically planting electrodes on the soil. Since the plant is not harmed by the energy-harvesting process, PMFC technology has the potential to simultaneously produce food (biomass) and generate electricity. As of now, power densities of PMFCs have remained low and commercialization is not yet possible. To achieve higher power densities, the stacking behaviour of PMFCs needs to be studied. In this study, several cells growing *Ocimum basilicum* (basil) and *Origanum vulgare* (oregano) were constructed and evaluated. Voltage readings of individual PMFCs revealed that the stage of development of the plant has a definite effect on power generation, which is observed to increase as the plant matures, and reaches an equilibrium value at maturity. Upon stacking, it was shown that the constructed PMFCs did indeed behave like batteries, where the voltage of cells connected in series are additive, and that the voltage of cells connected in parallel are constant. The actual values of voltage of stacked cells are similar to the expected value ( $\alpha=0.05$ ). Cumulative stacking tests revealed that there is no apparent loss in voltage upon stacking up to 9 cells growing *O. basilicum*. Further computation of power and power densities have proven that stacking is a viable method of amplifying electricity generation in PMFCs, as both increased with increasing number of cells connected in series.

# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0054 Presentation 3 (14:25~14:40)

Comparative Study on Performance Improvement of SPWM/THIPWM based DCMLI Grid Connected DFIG

Ahmed A Hossam-Eldin, Emtethal Negm, Mohamed S Elgamal and **Kareem M AboRas**

Department Of Electrical Engineering, Alexandria University, Alexandria, Egypt

*Abstract*—Multi-level voltage source converter is integrated in various fields in renewable energy power generation technologies such as wind and solar sources for applications that need higher voltage and higher power. In wind power generation market, doubly fed induction generator (DFIG) based on wind power generation is now the leading technology as they are economically feasible, they do offer a variable speed and efficient substitute to the fossil fuel. This paper proposes a DFIG based on a back to back diode clamped multilevel converter systems (DCMLI) fired comparatively by sinusoidal pulse width modulation (SPWM) and third harmonic injection pulse width modulation (THIPWM) techniques. By using these technologies, the DFIG performance is compared for different wind speeds under normal operation condition. The proposed approach shows that the DCMLI systems generate a near sinusoidal voltage with lower values in total harmonic distortion (THD) thus, upgrading the power quality that is produced by DFIG. Lastly, the variation of frequency of induced rotor voltage and the active power flow due to the wind speed changes when the rotor speed changes from super synchronous to sub synchronous speeds is investigated.

# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0015 Presentation 4 (14:40~14:55)

Compartmentalization and polarization studies of a Plant-Microbial Fuel Cell assembly with *Cynodon dactylon*

**Kristopher Ray S. Pamintuan**, Carl Samuel A. Reyes, Dheya Kristalyn O. Lat  
Mapua University, Manila, Philippines

*Abstract*—Plant-microbial fuel cells (PMFCs) are a class of renewable biomass energy that relies on the rhizodeposition of plants to generate power. In this study, the optimization of electrode spacing, number, and combinations were studied to maximize the power output of a soil PMFC growing *Cynodon dactylon*. To achieve this, compartmentalization tests were carried out as well as polarization. The anode-cathode distance was found to produce the highest voltage at 3 inches apart, wherein a smaller gap resulted to lower power, and a slight increase in the gap did not result to a loss of power. The use of multiple electrodes was also examined, and the results have shown that maximum power was obtained at inter-electrode distance of 18 cm. Smaller gaps registered lower voltages, and larger gaps gave a sudden drop in voltage. The effect of limiting one electrode was also observed. In anode-limiting conditions, it was found that both power and power density were maximum when there are 4 cathodes corresponding to one anode. When the reverse was done, it was shown that both power and power density continuously dropped if there are multiple anodes corresponding to one cathode only. This led to the conclusion that cathode design is more crucial in PMFCs as it utilizes the rate-limiting step. The tests of using multiple paired electrodes to determine the power-power density relationship results to a contradiction of behaviour in MFCs, wherein both power and power density increases as the electrode surface area is increased. These results are important building blocks to the goal of utilizing PMFCs in the future in larger scales with appreciable power generation.

# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0039-A Presentation 5 (14:55~15:10)

Residential Consumers’ Willingness to Pay Price Premium for Renewable Heat in South Korea

**Sang-Yeon Cho**, Seul-Ye Lim, Seung-Hoon Yoo

Seoul National University of Science & Technology, South Korea

*Abstract*—Heat is an important source of greenhouse gas emissions as the largest source of final energy demand, accounting for about one-third of the final energy use in South Korea. Using renewable heat directly produced from renewable energy such as bioenergy, geothermal or solar heat can save energy and reduce greenhouse gas emissions, rather than transforming renewable electricity into heat. Therefore, it is urgently needed to establish an energy policy for renewable heat. It is such situations that this paper attempts to assess the consumers’ additional willingness to pay (WTP) for renewable heat over heat produced from fossil fuels for residential heating. To that end, a contingent valuation (CV) survey of 1,000 households was conducted. Employing the model that allows for zero values, the mean of the additional WTP for one Gcal of heat, produced using renewable energy was estimated to be KRW 3,636, which is statistically meaningful at the 1% level. Given the heat, price for residential heating is approximately KRW 73,000 per Gcal, the additional WTP or premium corresponds to about 5% of it. This value represents the consumer benefit of renewable heat over heat based on fossil fuels.

# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0011 Presentation 6 (15:10~15:25)

Hourly Solar Radiation Analysis of Buildings within 48 Facings in XiaMen, China

**Chou Chia-Peng**, Yu, Zhihong

Fujian University of Technology, Fuzhou, China

*Abstract*—Energy concern in buildings plays an important role in electricity consumption and greenhouse gas emission. Natural resource concerned in early design stage will not only achieve energy-savings but has chance to improve sustainability during life cycle. This paper intends to discuss the relationship between solar access and heating and cooling loads in buildings via local climate condition, that is , the hourly data of sunshine hour records observed from 1953 through 2007. In this paper, AHRAE standard with base temperature of 26.7°C and 18.3°C for cooling and heating calculation of HVAC loads were used to determine the hot and cold periods in XiaMen. The direct solar radiation will be applied to accumulate solar radiation

values with 48 vertical facing for cooling and heating respectively based on the 45-year hourly sunshine hour. Annual solar radiation in 48 orientations will be studied to evaluate solar access in heating time and cooling time, moreover, difference in solar radiation value between heating time and cooling time shows solar demand and shading demand to assist reduction in heating and cooling loads for buildings in XiaMen. The results will provide more comparison and flexibility to be applied in thermal comfort and show a decision-making framework of solar access in early design stage for shading device design.

# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A0053 Presentation 7 (15:25~15:40)

How Weather Factors Affect Electricity Consumption in the Different Times Ranges: A Study in the Bangkok Metropolitan Region of Thailand

**Yada Ratanawaraha**, Tikhamporn Kaewkitipong, Sirapob Nardviriyakul and Jing Tang  
Sirindhorn International Institute of Technology , Thailand

*Abstract*—This paper analyses how weather factors affect electricity consumption in different time ranges in the Bangkok metropolitan region of Thailand. To answer this question, we use every 30-min data from 2015 to 2017 to discover the relationship between the electricity consumption and seven weather factors including temperature, dew point, relative humidity, wind (quantity), pressure, rainfall and, cloud using Pearson correlation. While the majority of people tend to think that temperature is the factor that contributed to load the most, our statistical result shows that temperature only affects electricity consumption in the very short term (within one day). In the weekly and monthly range, the electricity load is mainly associated with dew point. Hence, in different time ranges, different weather and climate factors contribute to electricity load. It suggests that future research and practice to choose carefully the factors in terms of electricity consumption prediction in different time ranges.



# Session 1

**Afternoon, April 26 (Friday)**

**Time: 13:55~15:55**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Renewable Energy Application”**

**Session Chair: Prof. Chia-Peng Chou and Dr. Shuo Wang**

A5018 Presentation 8 (15:40~15:55)

Analysis of Wave Characteristics of Offshore Wind Farm- Case Study in Miaoli Sea Area  
Yun-Chih Chiang, **San-Shyan Lin**, Hsing-Yu Wang, Hui-Ming Fang and Sung-Shan Hsiao  
National Taiwan Ocean University, Keelung, Taiwan

*Abstract*—There are two new offshore wind turbines and a sea weather observation tower in the outer sea of Miaoli in Taiwan. In order to meet the national energy policy, a number of offshore wind turbines will be built in the future. However, due to the special geographical conditions in Taiwan, the northeast monsoon is strong in winter and typhoon in summer. Special meteorological conditions will affect the hydrodynamic conditions of the sea area, further affecting the scouring conditions of offshore wind turbine foundations. In order to calculate the foundation scouring conditions, it is necessary to understand the local hydrodynamic conditions. This study used the two-year wave observation data of the sea meteorological observation tower for statistical analysis. The analysis results show that the wind and wave height data in the Miaoli area are highly correlated. The direction of the large wind speed is mainly in NE~NNE, and the large wave height is obtained under the same conditions. The joint probability distribution is used to fully describe the composition of the wave. By using a fixed interval, the contours show that most of the measured component waves are: the wave height is 0.5~1.0 m, and the period is 4~5 sec.



<b>Coffee Break</b>	<b>15:55~16:15</b>
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## Session 2

Afternoon, April 26 (Friday)

Time: 16:15~18:00

Venue: Vivaldi (4th floor)

**7 presentations-Topic: “Marine Ecology and Environment”**

**Session Chair: Assoc. Prof. Baoping Cai**

A5023-A Presentation 1 (16:15~16:30)

Evaluating the environmental costs of sea sand mining in South Korea: Results from a choice experiment survey

**Hyo-Jin Kim** and Seung-Hoon Yoo

Department of Energy Policy, Graduate School of Energy & Environment, Seoul National University of Science & Technology, 232 Gongreung-Ro, Nowon-Gu, Seoul, 01811, Korea

*Abstract*—According to the South Korean Government, a total of 10.7 million cubic meters of sea sand will be collected from the aggregate extraction complex in the exclusive economic zone of the South Sea from the end of this year to 2020. This article attempts to evaluate the environmental costs of sea sand mining. For this purpose, 1,000 households throughout the country were randomly selected and a choice experiment (CE) survey was undertaken with them in August 2018. The 4 attributes of the environmental impacts of sea sand mining considered here are coastal erosion, a decrease in benthos, a decrease in fish, and deterioration in the sea water quality. An increase in the yearly income tax is also considered as an attribute of the price. The results of applying the CE approach show that the environmental costs of a 1%p decrease in coastal erosion, a 1%p decrease in benthos, a 1%p decrease in fish, and a 1%p deterioration in the sea water quality are KRW 98 (USD 0.09), 76 (0.07), 162 (0.14), and 125 (0.11), respectively, per household per year. These results can be useful for policy making and decision making regarding a sea sand mining project.

## Session 2

**Afternoon, April 26 (Friday)**

**Time: 16:15~18:00**

**Venue: Vivaldi (4th floor)**

**7 presentations-Topic: “Marine Ecology and Environment”**

**Session Chair: Assoc. Prof. Baoping Cai**

A5013 Presentation 2 (16:30~16:45)

Assessment of coastal vulnerability to sea level rise: a case study of Prachuap Khiri Khan, Thailand

**Pattrakorn Nidhinarangkoon** and Sompratana Ritphring

Faculty of Engineering, Kasetsart University, 50 Jatujak, Bangkok, 10900, Thailand.

*Abstract*—The coastal zone of Thailand will get the effect from the eustatic sea level rise due to climate change. It is necessary to protect the coastal area from it. Therefore, coastal vulnerability index (CVI) was chosen to be a tool to identify the vulnerability of coastal zone in Prachuap Khiri Khan which is the study area. The physical and socioeconomic variables for CVI in this study were a coastal slope, rate of shoreline changes, geomorphology, signification wave height, tidal range, sea level changes, population density, coastal structure and land use. The CVI values was classified in 5 classes of vulnerabilities in the format of the coastal vulnerability map. The results presented that most of the coastal area in Prachuap Khiri Khan had very low to moderate vulnerability to sea level rise. It can be the preliminary analysis to develop the coastal management for this area in the future.

## Session 2

Afternoon, April 26 (Friday)

Time: 16:15~18:00

Venue: Vivaldi (4th floor)

**7 presentations-Topic: “Marine Ecology and Environment”**

**Session Chair: Assoc. Prof. Baoping Cai**

A5028 Presentation 3 (16:45~17:00)

Prediction of quantitative risk assessment and risk level criteria based on the data from oil tanker collision simulation at Kyauk Phyu Deep Sea Port, Myanmar

**Soe Nyi Nyi Toe, W Q Wu, and Y Chen**

Marine Engineering College, Dalian Maritime University, China

*Abstract*—The rates of ship accidents in waterways have been massively increased by many reasons including ship to ship collision. Collisions of crude oil tankers threat the health, safety and marine environment to its related surroundings. This study presents the QRA for double hull crude oil tanker collision in Kyauk Phyu Deep Sea Port of Myanmar navigational waterway by following the FSA guide lines. In order to present the useful simplified risk assessment method, the risk is predicted including frequencies, consequences analysis with the virtual ship collision model which is constructed based on the local situations. Furthermore risk acceptance criteria are also illustrated by F-N, F-T and F-P curves. The maximum acceptable risk levels are also conducted for social risk ( $1 \times 10^{-3}$  fatalities per year), environmental risk ( $0.7 \times 10^{-3}$  spills per year) and property risk ( $4 \times 10^{-1}$  USD per year) respectively. Ultimately, this paper aims to develop the IMO's FSA into simplified method and hopes to assist the local authorities' decision making process in case of tanker incident occurs in this area.

## Session 2

**Afternoon, April 26 (Friday)**

**Time: 16:15~18:00**

**Venue: Vivaldi (4th floor)**

**7 presentations-Topic: “Marine Ecology and Environment”**

**Session Chair: Assoc. Prof. Baoping Cai**

A5024-A Presentation 4 (17:00~17:15)

Social Acceptance of Increasing the Number of Loggerhead Turtles in South Korea: a Contingent Valuation Study

**Ga-Eun Kim**, Jae-Shin Lee and Seung-Hoon Yoo

Department of Energy Policy, Graduate School of Energy & Environment, Seoul National University of Science & Technology, South Korea

*Abstract*—The government is planning to increase the number of loggerhead turtles, which are one of representative endangered species in South Korea. If population of loggerhead turtles is increased, it is very helpful to maintain and manage a healthy marine ecosystem. This article tries to look into the social acceptance of the increase using a survey-based economic technique, the contingent valuation (CV) approach. Data gathering performed that professional research firm administrated a face-to-face national survey of 1,000 randomly-selected households. A one-and-one-half-bound model was adopted to elicit willingness to pay (WTP) responses, and the payment vehicle used was income tax. The WTP model used in this study is based on a utility difference approach and the spike model. The results showed that the public value of conserving loggerhead turtles was estimated to be 2,335 Korean Won per household over the next 10 years as of 2015, statistically significant at the 1% level. Expanding the values considered to include the national population gives a public value of 43.7 billion Korean Won. Thus, the social acceptance of increasing the number of loggerhead turtles through research such as spawning restoration and mating induction is not small.

## Session 2

Afternoon, April 26 (Friday)

Time: 16:15~18:00

Venue: Vivaldi (4th floor)

7 presentations-Topic: “Marine Ecology and Environment”

Session Chair: Assoc. Prof. Baoping Cai

A8003 Presentation 5 (17:15~17:30)

Automatic Geometric Correction of Complex Sea Condition Remote Sensing Image Based on Decision Tree Classification

Li Hua, Haigang Sui, Wei Ding, **Hongbo Fu**

State Key Laboratory of Information Engineering in Surveying Mapping and Remote Sensing, Wuhan University, Wuhan, China

*Abstract*—The geometric correction of ocean remote sensing image is a prerequisite for its data application. In this paper, to solve the problem that the sea island is sparse, cloud interference is severe, the control point is difficult to obtain, an automatic correction technique based on decision tree classification is proposed. In this paper, the image is processed by the method of super-pixel segmentation first. Then, the spectral and texture features in the superpixels are selected, including the energy value, the entropy and the correlation value of the gray level co-occurrence matrix and the normalized water index. Finally, the tree image classification model is used to classify the image superpixels, and the clear sky area which will be matched directly with the reference image can be extracted. Through the template matching and polynomial geometric model, the geometric correction of the remote sensing image is automatically corrected. Through the experiment of Landsat8 OLI\_TIRS image, compared with the classification results of the other two classification methods, the final precision is better than the other two methods. Therefore, the technical process proposed in this paper can be applied to the geometric correction of complex sea condition remote sensing images.

## **Session 2**

**Afternoon, April 26 (Friday)**

**Time: 16:15~18:00**

**Venue: Vivaldi (4th floor)**

**7 presentations-Topic: “Marine Ecology and Environment”**

**Session Chair: Assoc. Prof. Baoping Cai**

A5032-A Presentation 6 (17:30~17:45)

Mathematical modeling of flows driven by the strike-slip faulting

**Chi-Min Liu**

Chienkuo Technology University, Taiwan

*Abstract*—This paper presents a mathematical modeling for viscous flow generated by the strike-slip faulting. This type of faulting usually occurs below sea water and then generates flows above. Such a problem is also named as extended Stokes’ problem. Past results which include the infinite- and finite-depth cases are summarized herein to give a general understanding of this flow. Theoretical solutions are derived according to motions of two plates in opposite directions. The impulsive and the oscillating motions are considered to be solved in order to construct a basis for more complex motions.

## Session 2

Afternoon, April 26 (Friday)

Time: 16:15~18:00

Venue: Vivaldi (4th floor)

7 presentations-Topic: “Marine Ecology and Environment”

Session Chair: Assoc. Prof. Baoping Cai

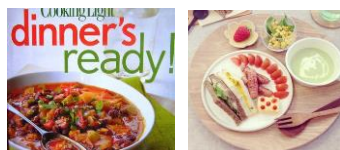
A5025-A Presentation 7 (17:45~18:00)

South Koreans’ Public Value of Restoring Ellobium Chinense: Results from a Choice Experiment Survey

**Ju-Hee Kim**, Sang-Yeon Cho and Seung-Hoon Yoo

Department of Energy Policy, Graduate School of Energy & Environment, Seoul National University of Science & Technology, South Korea

*Abstract*—The South Korean government is pushing for the restoration of Ellobium chinense, which belongs to the endangered marine species designated by Korea Ministry of Oceans and Fisheries. This article attempts to measure the public value of the restoration. For this purpose, a choice experiment (CE) approach is applied adopting four attributes: the number of habitats, the number of entities per habitat, the number of populations per habitat, and size of population. The attributes were determined through literature review and interviews with restoration experts. A nationwide survey was administered to randomly chosen 1,000 households. In the CE survey, the respondents were asked to carry out the works of trade-offs between the four attributes and price attribute by selecting a preferred alternative among three alternatives. A nested logit (NL) model is employed to obtain the parameter estimates for utility function and derive a marginal willingness to pay (MWTP) estimate for each attribute. The estimation results for the NL model show that the MWTPs for an increase in habitat, 100 entities increase per habitat, a population increase per habitat, and the expansion of 100m<sup>2</sup> size of population are estimated to be KRW 399 (USD 0.3), 742 (0.6), 953 (0.8), 709 (0.6) per household per month, respectively, which are statistically significant at the 1% level. Such information can be useful in assessing the public value of various restoration options.



Dinner

18:00



## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A5003 Presentation 1 (08:40~08:55)

Wave parameters influence on breakwater stability

**Al Sayed Ibrahim**, F S Abdelhaleem and A M Ali

Hydraulics Research Institute, 13621, Delta Barrages, Cairo, Egypt, National Water Research Center, Egypt

*Abstract*—This research paper experimentally explored the wave parameters effects on the breakwater armour layer stability. Breakwater stability mainly depends on the armour layer that guards the inner layers against the wave attack and the wave condition affects the breakwater stability. The wave height, length and steepness effect were investigated during the test program. Different formulas were available in the literature to predict the breakwater stability. The laboratory results were thus employed to assess the applicability of existing design equations. Experimental results showed that under normal wave condition ( $H_s$ ) the breakwater was stable, whereas under storm condition ( $H_s$  of 1.2 designed wave height) the roundhead reached the failure state. The results approved the impact of wave parameters on the breakwater stability and damage progression. Results revealed that the existing design formulas underestimate the structure stability.

## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A0018 Presentation 2 (08:55~09:10)

Friction measurement on Common Floor Using a Horizontal Pull slip meter

Samsiya Khaday and **Kai Way Li**

Chung Hua University , Taiwan

*Abstract*—The friction of floor is critical to the risk of slips and falls. In general, a person is more likely to slip when walking on a floor contaminate with water or soapy than dry surface condition. In this research, we conducted friction measurements on twelve floor tiles, the three surface conditions of the floors were dry, wet and soapy liquid contaminated the horizontal pull slip meter (HPS). Was used the measured coefficient of friction (COF) results showed that the HPS reported the readings of the measured COF on the same floor differently. It was found that floor tiles and surface condition were all significant on the measured COF. The horizontal pull slip meter (HPS) model defined in this study provides a mathematical description of the measured COF under the studied floor and surface.

## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A5015 Presentation 3 (09:10~09:25)

Characteristics and Effects of the Wave-Current Interaction in Laguna de Bay, Philippines: A Preliminary Investigation

F Alcaraz, M Climaco, K Ho, K Reyes and **M De Leon**

Civil Engineering Department, De La Salle University, Manila, Philippines

*Abstract*—Flooding in low-lying areas surrounding the perimeter of the Laguna de Bay has been a serious issue for the past decade after the construction of Manggahan floodway and the Napindan Hydraulic Control System to divert the flow of water coming from the Marikina River to Pasig River. In 2009, Typhoon Ketsana hit the Philippines and triggered the water level in the lake to rise at 13.85 meters causing flooding in nearby provinces of Rizal and Laguna, specifically in the areas of Angono, Baras, Morong, Mabitac, Santa Cruz, Pila, Victoria, Cabuyao and San Pedro. Another possible reason for flooding may be due to the inflows of waterbodies toward the lake coupled by the interaction of waves and currents within the lake. Thus, a research was conducted to investigate the characteristics and effects of the wave-current interaction in Laguna de Bay. Specifically, it addresses the following objectives, (1) to quantitatively describe the prevailing wave and current during normal and extreme conditions, (2) determine the magnitude and extent of water surface displacement effect of lake water due to inflow, wave and current parameters, and (3) to identify high risk areas prone to flooding.

## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A5016 Presentation 4 (09:25~09:40)

Numerical Study of the Kinematic Motions of a Solitary Wave Hitting an Inclined Plate

**Chih-Hua Chang**

Ling-Tung University, Taichung, Taiwan

*Abstract*—In this study, we numerically investigated the vortex patterns and free-surface deformations of a solitary wave interacting with a bottom-mounted plate at various inclinations in shallow water. Assuming two-dimensional, incompressible, and non-breaking conditions, we considered a viscous fluid based on the streamfunction-vorticity algorithm used in Navier–Stokes equations. We solved the governing equations by finite analysis, and used an averaged two-time step method to consider nonlinear conditions on the free surface. To fit the irregular boundaries and reveal the fine details of the vortex phenomenon, we applied a transient boundary-fitted grid along with a local-grid-refinement technique and examined the vortex mechanics around the submerged barrier. We then compared the numerical solutions obtained for the flow patterns with existing experimental observations to ensure the efficiency and accuracy of the numerical model. In addition, we systematically simulated other cases using this model to explore kinematic phenomena such as streamlines, equi-vorticity lines, streak lines, timelines, and path lines.

## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A5022 Presentation 5(09:40~09:55)

Free surface movement by a viscous numerical circular tank

**Xingyue Ren**

Hainan University, China

*Abstract*—Based on the incompressible flow model, a finite volume scheme using the zonal embedded grid system was applied to investigate the free surface motion and interactions with a vertical circular cylinder inside a three-dimensional circular tank. By using the one fluid assumption, both the water and air phases were considered with Navier-Stokes equations in the cylindrical coordinates and the free surface was tracked by volume of fluid (VOF) method. With the cylindrical coordinates, the zonal embedded grid system was implemented in the present study to refine the grid system. And the numerical model based on this technique is then applied to the computation of circular dam break problem and oblique wave training inside a circular tank, and a good agreement were obtained through the comparison with theoretical results.

## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A5021 Presentation 6(09:55~10:10)

A study on the Motion Sickness Incidence according to the Position in the Ship.

**Dong Hyup Youn** and Chung Hwan Park

Research Institute of Medium & Small Shipbuilding, Busan, Korea

*Abstract*—As the sea condition becomes rough, the crew and passengers on board are experiencing stress and motion sickness. Particularly, in the case of motion sickness, the ability to perform tasks falls sharply, and it takes considerable time to recover. In this study, the motion performance of wave in KVLCC2 was evaluated, and the vertical acceleration component of each ship's position in the actual sea environment condition was calculated by hull motion calculation method. The vertical acceleration spectrum was used to indicate the degree of motion sickness according to the change of velocity of KVLCC2. Motion sickness incidence (MSI) calculation was performed with 0 knots, 5 knots, 10 knots, 15 knots, 20 knots, and 25 knots. As a result, weights of vertical acceleration were higher in order, and higher in pitching than in rolling.

## **Session 3**

**Morning, April 27 (Saturday)**

**Time: 08:40~10:40**

**Venue: Vivaldi (4th floor)**

**8 presentations-Topic: “Ocean Engineering and Physics”**

**Session Chair: Prof. Chou Loke Ming**

A5011 Presentation 7 (10:10~10:25)

Evaluation of Tsunami Scouring on Subsea Pipelines

**Risako Komata**

Tokyo Gas Co. Ltd., Yokohama, Japan

*Abstract*—It is important that subsea pipelines are designed and maintained to withstand earthquakes and tsunamis, especially in earthquake-prone regions such as Japan. Tsunami scouring of the seabed may reduce the amount of soil covering a subsea pipeline, exposing it to harmful wave action. In this study, we investigated the feasibility of a subsea pipeline by calculating the tsunami scouring volume for representative tsunamis via numerical analysis. As a case study, we determined how subsea pipelines in the Kashima-nada sea area, Japan, would be affected. The results obtained indicate that for both a level 2 tsunami and a level 1 tsunami, scouring does not significantly affect the pipeline and no construction is subsequently required to restore the soil cover.

## Session 3

Morning, April 27 (Saturday)

Time: 08:40~10:40

Venue: Vivaldi (4th floor)

8 presentations-Topic: “Ocean Engineering and Physics”

Session Chair: Prof. Chou Loke Ming

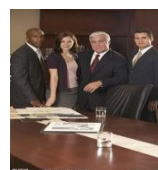
A0029 Presentation 8 (10:25~10:40)

Subjective Ratings of Floor Slipperiness on Common Indoor and Outdoor Floors

**Oyun-Erdene Enkhjargal** and Kai Way Li

Chung Hua University, Taiwan.

*Abstract*—Slip and fall incidences are common in our daily lives. They are not only serious environmental safety issues but also important occupational safety and health problems. Floor slipperiness has been identified as one of the critical factors affecting the risk of slip and fall. Floor slipperiness may be quantified by measuring the coefficient of friction of the floor. It may also be determined by human judgements. How people perceive floor slipperiness is an important topic affecting the likelihood of a slip/fall incidence. The purpose of this study was to determine the difference of perceived floor slipperiness by human subjects under different floor roughness levels, floor conditions and sensation mode. The results showed that the effects of the three factors on the subjective ratings were statistically significance ( $p < 0.0001$ ). The two-way and three-way interaction effects were also significance ( $p < 0.0001$ ). The results of the study are beneficial in housekeeping and safety training at workplaces to reduce slip & fall incidences.



Coffee Break

10:40~11:00



## Session 4

Morning, April 27 (Saturday)

Time: 10:55~12:25

Venue: Vivaldi (4th floor)

**6 presentations-Topic: “Wastewater Treatment and Health”**

**Session Chair: Prof. Koh Hock Lye**

A1001 Presentation 1 (10:55~11:10)

Potential Use Scenarios of Hybrid Biological Reactor for Petrochemical Industry Wastewater Treatment

**Mohd Elmuntasir Ahmed**, Rashed Al-Yaseen, Andrzej Mydlarczyk , Adel Al-Haddad  
Kuwait Institute for Scientific Research, Water Research Center, Kuwait

*Abstract*—In many instances integrated film biological reactors or biofilm reactor, intended by design, may actually be operating in a suspended and/or attached biological growth modes and, therefore, these reactors are termed “hybrid” biological reactors. The hybrid reactor process can be used as a normal wastewater treatment process the same way as an activated sludge process (ASP) or an attached growth process. In addition to their many advantages including good performance, simplicity of operation, and ability to absorb shock loads, hybrid biological reactors can be optimized to maximize degradation rates of organics including compounds of emerging concern and, hence, they are promising technology in treating industrial wastewaters.

As petrochemical industrial wastewater contains many recalcitrant compounds, the potential of hybrid biological reactors may present a resource to be tapped, especially in the actual operation of an industrial wastewater treatment facility such as Al-Wafra industrial wastewater treatment plant in Kuwait treating primarily petrochemical industry wastewater.

This paper examines possible scenarios for use of hybrid reactors in existing Al-Wafra industrial wastewater treatment plant to improve its efficiency due to loss of biomass in the activated sludge process caused by extreme conditions of the industrial wastewater it receives and its inhibitors. The main innovation in this study, the hybrid reactor was constructed using a biological carrier of the high surface area Random Packing type and was operated using real wastewater samples from Al-Wafra Industrial wastewater Treatment plant. The modalities of operation included high dissolved oxygen levels (4.0 mg/l), low dissolved oxygen levels (2.0 mg/l), and under ANNAMOX conditions.

The experiments took into consideration the sequence of the hybrid reactor in the treatment scheme, its efficiency, economic costs, and the overall improvement in the industrial wastewater treatment plant performance. The testing of the integration scenarios was conducted in a pilot hybrid biological reactor using real samples from the various stages of treatment at an industrial wastewater treatment plant in Kuwait.

Results revealed that stable biomass have developed on the support media of the hybrid biological reactor with attached to suspended biomass ratio exceeding 70% and improved efficiency of the first sequence (hybrid-to-ASP) process for TOC removal of 11-17% and 19-26% for the second sequence (ASP-to-hybrid) combination depending on the operating conditions. These results clearly reflect the unfavorable conditions for biodegradation after the primary chemical treatment at Al-Wafra plant.

In addition, the dominant bacterial species were identified as pseudomonas species favor less acidic environments which were achieved after the ASP. In terms of nitrification/denitrification, the process met the ammonia and total nitrogen Kuwait standards for irrigation water of 15 and 35 respectively.

## **Session 4**

**Morning, April 27 (Saturday)**

**Time: 10:55~12:25**

**Venue: Vivaldi (4th floor)**

**6 presentations-Topic: “Wastewater Treatment and Health”**

**Session Chair: Prof. Koh Hock Lye**

A0009 Presentation 2 (11:10~11:25)

A detergent destruction method used for aerobic treatment of wastewater high in detergent content (WHD)

**Kok Ngee Tan**

K N Tan Enviro-Technologist, Singapore

*Abstract*—Detergent removal from wastewater treatment is important for environmental protection. Biosorption of detergent onto the activated sludge enables aerobic treatment of the wastewater. This paper presents a further improvement of the method by a massive destruction of the detergent through a prolonged mixing of the detergent with the activated sludge prior to the aeration process. This is possible as detergent is a cleaning agent and can breakdown the activated sludge through intimate contact in the mixing process. Thickening of the activated sludge and culturing activated sludge with high biosorption capacity ensures the intimate contact for the detergent destruction action. Breaking down of the activated sludge provides a high loading condition which favors the growth of microorganism with strong biosorption capacity. The method was successfully implemented in the detergent packing plant.

## Session 4

Morning, April 27 (Saturday)

Time: 10:55~12:25

Venue: Vivaldi (4th floor)

**6 presentations-Topic: “Wastewater Treatment and Health”**

**Session Chair: Prof. Koh Hock Lye**

A5030 Presentation 3 (11:25~11:40)

Enhancement of Biological Nutrient Removal in an Alternating Anaerobic-Aerobic Sequencing Batch Reactor: Optimization of Anaerobic and Aerobic Hydraulic Retention Times

**Jiwei Pang**, Shanshan Yang, X Y Yang, Z Y Wu, N Q Ren  
Harbin Institute of Technology, Harbin 150090, PR China

*Abstract*—Biological phosphorus removal (BPR), possesses the significant advantages of low operational costs and little environmental impacts, is an economical and sustainable process to remove P by recycling the activated sludge through anaerobic and aerobic processes. For the BPR system, the hydraulic retention times (HRT) in aerobic and anaerobic processes are the most significant controlling parameters which can directly affect the effluent quality, especially the effluent phosphorus removal efficiencies. In this study, six lab-scale sequencing batch reactors (SBRs) were operated to conduct the single-factor experiments. 13 experimental runs designed by a 2-factor and 5-level response surface methodology (RSM) using Central composite design (CCD) were used to optimize the relationship between anaerobic HRT (X1, h) and aerobic HRT (X2, h) and two most important responses, COD removal efficiency (CRE, Y1, %) and P removal efficiency (PRE, Y2, %). High squared regression coefficients  $R^2$  ( $> 0.99$ ) and adjusted  $R^2$  ( $> 0.99$ ) indicated a high degree of correlation between the predicted and actual responses, which means that the model could fit the response well. Experimental validation by operating under the optimal combination of the two operational HRTs were conducted. Good correlation between the predicted and experiments values provides confidence in the obtained models.

## Session 4

**Morning, April 27 (Saturday)**

**Time: 10:55~12:25**

**Venue: Vivaldi (4th floor)**

**6 presentations-Topic: “Wastewater Treatment and Health”**

**Session Chair: Prof. Koh Hock Lye**

A0055 Presentation 4 (11:40~11:55)

Techno-Economic Optimization and New Modeling Technique of PV-Wind-Reverse Osmosis Desalination Plant at Variable Load Conditions

**Ahmed A. Hossam-Eldin**, Kamal A. Abed, Karim H. Youssef, and Hossam Kotb  
Faculty of Engineering, Alexandria University , Egypt

*Abstract*—In this paper, a new modeling technique of a seawater reverse osmosis (RO) desalination plant fed by hybrid renewable energy sources is provided. The proposed model consists of five sub-systems including RO plant model, photovoltaic (PV) model, horizontal wind turbine (HWT) model, battery model and the control room unit. In the RO model, the process is optimized to have the lowest specific energy consumption under different operating conditions and variable productivity ranging from 100 to 10000 m<sup>3</sup> per day. However, in the PV and HWT models, various manufacturing datasheets for PV panels and wind turbines are stored at different power ratings. The model allows the selection of appropriate design specifications based on average solar radiation and average wind speed at the site. In addition, the total battery storage, Ampere-hour capacity and other specifications are calculated in the battery model. The control room unit is responsible for calculating the total annual costs and the cost of fresh water production according to the plant productivity, lifetime and interest rate. It has a splitter control ratio to regulate the load distribution between PV and wind turbines relative to changes in climatic conditions. The model is simulated using Matlab/Simulink and provides good results for model validation.

## Session 4

**Morning, April 27 (Saturday)**

**Time: 10:55~12:25**

**Venue: Vivaldi (4th floor)**

**6 presentations-Topic: “Wastewater Treatment and Health”**

**Session Chair: Prof. Koh Hock Lye**

A0008 Presentation 5 (11:55~12:10)

Tuberculosis Elimination in Malaysia by 2035: Linkages and Implications to SDGs  
Hock Lye Koh, Mohamed Naim Abdul Kadir, Noorliza M. Noordin and **Su Yeon Teh**  
Universiti Sains Malaysia, Malaysia

*Abstract*—Good health and wellbeing (SDG 3) is a fundamental human right for all. The main determinant for good health and wellbeing critically depends on equitable access to good health care (SDG 10) consisting of a combination of strong primary health care (PHC) oriented around community and efficacious public health services (PHS) based upon hospital and professional services. The world including Malaysia has been fortunate to witness dramatic improvement in the delivery of health services due to advances in social-economic development. Yet several diseases remain a daunting challenge to sustainable development goals (SDGs). A disease of the poor and the impoverished, tuberculosis (TB) is the leading infectious disease that kills more than a million people each year worldwide. Tuberculosis infection and disease progression are primarily driven by social-economic and cultural factors such as poor living conditions, poor nutrition and misplaced cultural beliefs. Yet, management of TB has been mainly biomedical, without addressing the social-economic and cultural drivers, since the 1940s. Given the status of ineffective management, TB will continue to pose a real threat to SDGs, especially among the poor and susceptible populations in many parts of the world, including Malaysia. This paper addresses global issues regarding TB management in the context of SDGs and suggests reorientation of health care towards PHC to accelerate achievement of SDG 3 and other broader SDGs. A detailed case study on Malaysian health care for TB is presented to review the needs for change in TB management strategy. The paper proposes policy and program modification necessary to achieve by 2035 the WHO End TB Strategy goals and UN SDGs.

## Session 4

Morning, April 27 (Saturday)

Time: 10:55~12:25

Venue: Vivaldi (4th floor)

**6 presentations-Topic: “Wastewater Treatment and Health”**

**Session Chair: Prof. Koh Hock Lye**

A0030 Presentation 6 (12:10~12:25)

Factors affecting trunk fatigue and the maximum endurance time of one-leg static squat

**Wenbao Li**, Kai Way Li, Jingjing Chen and Bin Feng

Chung Hua University, Taiwan

*Abstract*—One-leg static squat is a classic movement of lower limb muscle strength training and functional rehabilitation of the lower limbs. It is often used in the fields of exercise and exercise rehabilitation. This study was designed to determine the effects of gender, leg used, and back support mode on the maximum endurance time (MET) and CR-10 score of trunk fatigue under the two experimental conditions. Thirty adults participated in the study. A three-factor (sex, support legs, back support mode) experiment was performed. Descriptive statistics, analysis of variance (ANOVA), and correlation analysis were performed. The results showed that gender ( $p<0.01$ ), supporting leg ( $p<0.05$ ), and gender $\times$ back support mode ( $p <0.01$ ) were all significant on the MET. Gender ( $p<0.01$ ) was significant on the CR-10 score. There was a significant difference in the supporting time between the left and right legs of males and females. Whether it was supported by the wall or the yoga ball, the trunk of the males was significantly higher than those of the females. The coordination ability of the males' trunk and lower limbs was significantly different.



<b>Lunch</b>	<b>12:25</b>
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# Poster Session

**April 26(Friday): 09:15-18:00**

**April 27(Saturday): 08:40-12:25**

**Venue: Vivaldi**

A5001 Presentation 1

Thinking from a sea bauxite accident

**Qi Liu**, Baijun Tian, Xintong Qiu, Lixia Zhang, IACSIT

College of Navigation, Dalian Maritime University, Dalian, China

*Abstract*—In this paper, a typical case of transporting bauxite ore on the ship is studied. From the perspective of maritime safety, the bauxite is studied in the classification of goods in the IMSBC rules and the improvement measures in the current transportation process are proposed to provide the maritime transport, So as to provide reference for maritime transport and reduce the recurrence of such accidents.

A5008 Presentation 2

Steady State Analysis and Optimization for Autonomous Underwater Vehicle

**Peng Liu**, YongHong Liu, BaoPing Cai, ZhenWei Niu and XiaoXuan Wei

College of Mechanical and Electronic Engineering, China University of Petroleum (East China), Qingdao, Shandong 266580, China

*Abstract*—Autonomous Underwater Vehicle (AUV) is widely used in ocean engineering field. Steady state analysis of AUV is considered as a necessary part in the design process. Motivated by improving the stability, a downwash filter based feedback optimization methodology for AUV is presented. First, combined with AUV structural parameters, the AUV four-degree of freedom motion space mathematical model is calculated to provide a mathematical basis for rock-bottom steady state control system. Second, the transfer function of the filter is derived according to the zero-pole and trajectory map of the AUV ontic system. Finally, the AUV optimized control system is established by series downwash filter. The simulation analysis result shows that the stability of the system is greatly increased after the whole system is connected to the filter.



# Poster Session

**April 26(Friday): 09:20-18:00**

**April 27(Saturday): 08:40-12:25**

**Venue: Vivaldi**

A5009 Presentation 3

Influence of Large-scaled Reclamation on the Cold Wave in Coastal Area of Jiangsu Province  
**Hongsheng CAO**, Xishan PAN, Chunhui LI, Yan WANG, and Shaopeng WANG Nanjing Hydraulic Research Institute, Nanjing, China  
Nanjing R&D Tech Group Co., Ltd., Nanjing, China

*Abstract*—Taking the large-scaled reclamation in Jiangsu Sea as study background, on the premise of large-scaled area (East China Sea) having a good accuracy. The cold wave of Jiangsu Sea is simulated by the nested model of SWAN, and analysing the Hs (significant wave height) near the reclamation area extracted from the results. It is found that the cold wave field around the reclamation area is influenced remarkably by large-scaled reclamation. The large change of wave field is mainly concentrated in the southern part of central Jiangsu province, and it has a significant influence on the wave field. Due to the effect of covering, the wave height of the southern sea area of Dongsha, Gaoni and Lengjiasha reclamation area decreases greatly, and the decline can be as much as 30%. Due to the extent of reclamation is small, the change of wave field in the northern part of Jiangsu province is not obvious, and the range of change is not obvious.

# Poster Session

**April 26(Friday): 09:20-18:00**

**April 27(Saturday): 08:40-12:25**

**Venue: Vivaldi**

A5010 Presentation 4

Numerical Simulation of the Influence of Large-scale Structures on Wave Force of Adjacent Small-scale Bars in Composite Structures

**Zhenglin Li**

Civil and Transportation College, South China University of Technology, Guangzhou 510640, China

*Abstract*—In order to calculate the wave loads on the small and medium scale bars of composite structures accurately, not only the action of incident wave but also the wave diffraction caused by near large-scale structure and the effect of radiation on wave load of small scale bars should be considered. In this paper, based on the VOF method, the three-dimensional wave numerical flume of the wave acting on the composite structure is constructed in Fluent. The incident wave force, diffraction wave force and total force acting on the composite structure are obtained by numerical calculation. Compared with the results obtained by using the Morison formula alone, the effectiveness of the wave loads calculated by the model is verified. The results show that under certain wave conditions, the wave diffraction caused by large-scale structures can not be ignored. In addition, the influence of the incident wave number, the diameter of the pile and the position of the pile on the wave load of the small-scale pile is also studied. The results can provide a scientific reference for the accurate calculation of wave loads on small-scale piles in marine engineering with composite structures.

# Poster Session

**April 26(Friday): 09:20-18:00**

**April 27(Saturday): 08:40-12:25**

**Venue: Vivaldi**

A5012 Presentation 5

Experimental Study on Wave Interaction with Multiple Row Pile Breakwater

**S Sultana** and A Rahman

Mott McDonald, Dhaka, Bangladesh

*Abstract*—Coastal works where the tranquillity requirements are low porous pile breakwaters are considered as a good cost-effective substitute for the conventional type of breakwaters. In this study, an experimental investigation has been carried out in a two-dimensional wave flume to study the wave interaction with vertical pile breakwater. At 50 cm still water depth ( $h$ ), interactions between regular waves (wave period  $T = 1.5$  sec, 1.6 sec, 1.8 sec and 2.0 sec) and the pile breakwater of two different porosity ( $n = 0.65$  and 0.80) and three different structure heights ( $h_b = 40$  cm, 50 cm and 60 cm) have been studied experimentally. Experimental results reveal that, minimum transmission coefficient ( $K_t = 0.55$ ) is obtained for breakwater with lowest porosity ( $n = 0.65$ ) and with emerged condition ( $h_b/h = 1.2$ ) for short wave period ( $T = 1.5$  sec). Minimum reflection coefficient is obtained for breakwater with highest porosity ( $n = 0.80$ ) and with submerged condition ( $h_b/h = 0.8$ ). It is also noticed that porosity has an effect on wave energy loss coefficient.

# Poster Session

**April 26(Friday): 09:20-18:00**

**April 27(Saturday): 08:40-12:25**

**Venue: Vivaldi**

A8002 Presentation 6

Calculation on the Uprighting Process of a damaged-capsized ship

**Pan Dewei**, Sun Yuqiang, Kong Fanyi, Sun Yuhao and Ma Jianwen

Navigation College, Shandong Jiaotong University, Weihai 264200, China

*Abstract*—Righting a damaged-capsized ship can be very complicated. In this paper, flooding quantity and three-dimensional mathematical model of righting force are introduced in order to solve the buoyancy and stability of a capsized ship. Through the simulation, the uprighting process of a damaged-capsized ship with air cushion was researched. Computation result shows that the proportion between the maximum righting moment in the opposite direction and the maximum righting moment is 2.891. Trim decreased gradually during the uprighting process, so it reached the minimum value when the ship returned to equilibrium location. The quantity of flooding water increased slowly in the later process when the opening was beneath the water level. For each calculation, the maximum shear force was located at the same position, which does not increase with flooding quantity.

# Poster Session

**April 26(Friday): 09:20-18:00**

**April 27(Saturday): 08:40-12:25**

**Venue: Vivaldi**

A0058-A Presentation 7

An analytic study of Defect Occurrence Prediction by Deep Machine Learning on the Variables of Construction Company Level-Local Area-Size of Unit-Building Height and the Number of Apartment Householders

**Deokseok Seo, Junmo Park, Kangwoo Lee**

Department of Architecture, Halla University, South Korea

*Abstract*—In Korea, as urbanization progressed rapidly in the 1980s and 1990s, apartments became a common type of housing. In particular, apartments with more than five floors are the main types of housing. Apartments in Korea account for more than half of all housing units, and 59 percent as of 2010. However, after becoming a typical residential type, the number of lawsuits related to apartment defects began to skyrocket. The issue in the apartment-related defect lawsuit is how many defects are generated and how much is the judgment amount due to the defect. Also, since the judge determines the judgment amount of defects depending on how many defects are generated in the apartments, it became an important concern for the construction company to predict how many defects were generated in the apartments they had built. For this reason, it is important for apartment suppliers to predict the extent of defects in apartment complexes they have been constructed. In this research, by using the Deep Machine Learning technic, we tried to predict defect occurrence frequency for the first year of finishing work which showing the highest defects occurrence rate. Construction Company Level-Local Area-Size of Unit-Building Height and the Number of Apartment Householders were used as variables to predict defect occurrence frequencies. By this analysis, the average of difference between the frequency of real defects and predictions was 22.82%. The prediction by Deep Machine Learning model using the corresponding variables shows relatively accurate

# One Day Visit

**April 28, 2019. (Sunday) 9:30~17:00**

*(Tip: Please arrive at "Avani Atrium Bangkok" at 9:20 a.m. The following places are for references, and the final schedule should be adjusted to the actual notice.)*

## 1. (9:30-12:00am) Morning Visit

### The Grand Palace

The Grand Palace are a complex of buildings at the heart of Bangkok, Thailand. The palace has been the official residence of the Kings of Siam since 1782. The king, his court, and his royal government were based on the grounds of the palace until 1925. It was built in 1782 and features several magnificent buildings including Wat Phra Kaeo (Temple of the Emerald Buddha), which contains a beautiful Emerald Buddha that dates back to the 14th century.



### Khaosan Road

Khaosan Road or Khao San Road is a short street in central Bangkok, Thailand constructed in 1892 during the reign of Rama V. It is also a base of travel: coaches leave daily for all major tourist destinations in Thailand, from Chiang Mai in the north to Ko Pha Ngan in the south, and there are many relatively inexpensive travel

agents who can arrange visas and transportation to the neighbouring countries of Cambodia, Laos, Malaysia, and Vietnam.

## 2. (12:00-13:30) Lunch time

### 3. (14:00-16:30) Afternoon visit

#### Chatuchak Weekend Market

Chatuchak Weekend Market (or Jatujak Market) is one of the world's largest weekend markets covers area of 70 rai (27 Acres) altogether divided into 27 Sections, contains more than 15,000 booths selling goods from every part of Thailand. There are almost everything can be found here at a bargaining local price (not a tourist price), and most vendors actually come from local factories, like antique wood carving, clay handicrafts, local souvenirs from every parts of Thailand, Buddhist amulets, wooden funitures, etc..



#### Lumphini Park

Lumphini Park is a 360 rai park in Bangkok, Thailand. The park offers rare open public space, trees, and playgrounds in the Thai capital and contains an artificial lake where visitors can rent boats. There is also a basketball court if you want to shoot some hoops. Often, local jazz outfits or even a classical orchestra make for fine (and free) late Sunday afternoon entertainment. Mats can be hired for 30 baht, and light snacks are readily available from the closest hawker's stall.



### 4. (16:30) Back to Avani Atrium Bangkok.

(Please note that the tickets will be at guest's own expense)











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