



The 5th International Conference on Advances in Civil and Ecological Engineering Research (ACEER 2023)

July 4th-7th, 2023

Macao, China / Online via MS TEAMS

Conference Program & Abstract Proceedings



I-Shou University
Department of Civil
Engineering



Bosen Academic Research Institute



澳門會展旅遊業協會
ASSOCIACAO DOS SETORES DE CONVENCoes, EXPOSICOES E TURISMO DE MACAU
MACAO ASSOCIATION OF CONVENTION, EXHIBITION & TOURISM SECTORS

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Part I Conference Schedule Summary

Tuesday, July 4, 2023

Location: Lobby of Regency Art Hotel

MS Teams Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

09:00-18:00 On-site Registration

14:00-19:00 Microsoft Teams Online Testing

Notice (for offline participants):

- 1. Please show us the acceptance letter or paper ID for registration;**
- 2. Please take the name card during conference, Macao Pass¹ for meals and field visit tickets while joining the field visit.**

Wednesday, July 5, 2023

Location: Drawing Room (1F), Regency Art Hotel

MS Teams Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

Welcome Speech

09:00-09:10

Prof. Chih-Huang Weng, Department of Civil Engineering, I-Shou University

Keynote Speech 1: A Breakthrough Achievement of Water and Wastewater Treatment Toward Environmental Sustainability and Carbon Neutrality: Multifunctional Photoelectrochemical Technology

09:10-09:50

Prof. Irene Man Chi Lo, Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology

Keynote Speech 2: Groundwater Arsenic Contamination Destined by Landscape Evolution in Response to Sea Level Change in the Context of Global Change

09:50-10:30

Prof. Zhongping Lai, Institute of Marine Sciences, Shantou University

10:30-10:50 **Group Photo & Coffee Break**

Keynote Speech 3: Fenton's and Activated Persulfate Oxidation Processes for Efficient Degradation of Synthetic Dyes

10:50-11:30

Prof. Chih-Huang Weng, Department of Civil Engineering, I-Shou University

11:30-12:00 **Poster presentations**

12:00-14:00 **Lunch Break (A Pousada/玲瓏閣餐廳, Ground Floor)**

¹ Macao Pass will be provided during registration for dinner on July 6th and Lunch on July 7th. Macao Pass can be used in Public Transit, Convenience Store, Supermarket, Café and Self-service Vending Machine in Macao.

Wednesday, July 5, 2023

Location: Drawing Room (1F), Regency Art Hotel

MS Teams Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

14:00-17:35 **Oral Session 1: Environment Pollution and Wastewater Treatment**

17:45-18:00 Gather at the Lobby of Regency Art Hotel (**Set off on time at 18:00**)

18:30-20:20 Buffet Dinner at Macao Tower (With Buffet Dinner Ticket)

20:20-20:30 Gather at the Ground Floor of Macao Tower (**Set off on time at 20:30**)

20:30-21:00 Back to Regency Art Hotel

Thursday, July 6, 2023

Location: Drawing Room (1F), Regency Art Hotel

MS Teams Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

09:00-12:15 **Oral Session 2: Ecological Engineering, Environmental Engineering, and Energy**

12:15-13:45 **Lunch Break (A Pousada/玲瓏閣餐廳, Ground Floor)**

13:45-17:00 **Oral Session 3: Structural Engineering, Geological Engineering, and Sustainable Development**

Friday, July 7, 2023

08:15-08:30 Gather at Lobby of Regency Art Hotel (Set off on time at 8:30)

08:30-16:00 One Day Field Visit in Macao City (with Field Visit Ticket)

16:00-16:10 Gather at the Ground floor of Venetian Macao (Set off on time at 16:10)

16:10-16:30 Back to Regency Art Hotel

Part II Keynote Speeches

Keynote Speech 1: A Breakthrough Achievement of Water and Wastewater Treatment Toward Environmental Sustainability and Carbon Neutrality: Multifunctional Photoelectrochemical Technology



*Prof. Irene Man Chi Lo
Chair Professor of Civil & Environmental Engineering,
Institute For Advanced Study (IAS) Senior Fellow,
The Hong Kong University of Science & Technology*

Biography: Ir Prof Irene M.C. LO, JP is currently a Chair Professor in the Department of Civil and Environmental Engineering at The Hong Kong University of Science and Technology (HKUST). She is an elected Academician of the European Academy of Sciences and Arts (EASA), the first Hong Kong scholar inducted into the EASA. She is an elected Fellow of the Hong Kong Institution of Engineers (FHKIE), and elected Fellow of the American Society of Civil Engineers (FASCE). She was appointed by HKSAR Government as Justices of the Peace (JP) in 2017. She was also Adjunct Professor of Tongji University, Tianjin University, Jilin University and Harbin Institute of Technology in China. She had been Visiting Professor of Technical University of Denmark and the University of Wisconsin at Madison.

She was the recipient of the 2004 ASCE James Croes Medal, the 2007 ASCE Samuel Arnold Greeley Award, the 2008 EWRI Best Practice-Oriented Paper Award, the 2009 ASCE Wesley W Horner Award, and the 2012 ASCE EWRI Best Practice-Oriented Paper Award. In addition, she received the Ministry of Education's 2019 Higher Education Outstanding Scientific Research Output Awards in the Natural Science/Technology Advancement. She has been invited to give plenary/keynote/invited speeches over 40 times at many international conferences around the globe.

Her research interests include advanced oxidation processes, nanoparticles and nanotechnology for environmental applications, water and wastewater treatment, soil and groundwater remediation, and solid waste treatment and disposal. She was recognized as "Top 2% Scientists in the World" in the environmental science/engineering as reported by the study conducted by Stanford university in 2020.

Abstract: Conventional water and wastewater treatment processes are inefficient in degrading pharmaceuticals and personal care products (PPCPs) and cause high carbon emissions. Herein, a multifunctional photoelectrochemical (PEC) system for coupled the removal of contaminants with H₂ evolution was developed to address the above limitations. As for water treatment, we developed a sulfite-adding PEC system using an optimized BiVO₄ photoanode, which can simultaneously promote PPCPs degradation, E. coli inactivation, and H₂ evolution (as green and renewable energy) via activating sulfite under visible light illumination. Sulfite ions could be activated by holes to produce sulfate radicals for contaminant removal and work as hole scavengers to promote electron separation for H₂ production. Regarding wastewater treatment, we developed a low carbon emission PEC system to treat saline sewage for coupled the removal of organic compounds, ammonia, and bacteria with H₂ generation. A reduced BiVO₄ (r-BiVO₄) photoanode possessing excellent PEC reactivity achieved by introducing oxygen vacancies and V⁴⁺ species was synthesized for the PEC system, treating saline sewage to meet the discharge standard in 40 minutes (with a complete removal of PPCP) coupled with significant H₂ production as green energy. The PEC system reduced 93% of carbon emissions compared with conventional wastewater treatment due to the reduced generation of N₂O and CH₄. Chloride ions in saline

sewage were activated to produce reactive chlorine species, facilitating contaminant removal and re-training N₂O generation. Overall, the multifunctional PEC systems are promising for water and wastewater treatment toward carbon neutrality because of their high efficiency in contaminant removal and significant H₂ evolution to offset carbon emissions.

Keynote Speech 2: Groundwater Arsenic Contamination Destined by Landscape Evolution in Response to Sea Level Change in the Context of Global Change



Prof. Zhongping Lai
Head of Luminescence Dating Laboratory & Quaternary Geology Group,
Institute of Marine Sciences,
Shantou University

Biography: Prof. Zhongping Lai is currently a professor in Shantou University, and the head of luminescence dating laboratory and Quaternary geology & marine geology group. He obtained his PhD in 2005 from Oxford University as a Clarendon Scholar. He was then awarded an Alexander von Humboldt Fellowship and spent nearly two years in Marburg and Bayreuth Universities in Germany. He came back to China in late 2007 in Chinese Academy of Sciences (2007-2014), in China University of Geosciences (2014-2018), and in Shantou University since 2018. He has published more than 170 papers in international SCI journals, such as Earth and Planetary Science Letters, Geophysical Research Letters, Catena, Quaternary Science Reviews, Geomorphology, Quaternary Geochronology, Science of the Total Environment, Environmental Pollution, Frontiers in Marine Science. In ResearchGate, he has an h-index of 46 and a citation of >6200.

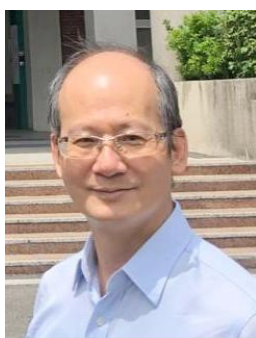
He is currently the Editor of “Catena” and a member of editorial boards of “Geochronometria”. He has also served as associate editors for both "Quaternary Research (2010-2017)" and "Aeolian Research (2010-2017)", and as reviewers for British NERC, Switzerland NSF, and Norway NSF. He was selected in both lists, established by Stanford University, of the “World's Top 2% Scientists 2021: Career-long impact”, and of the “World's Top 2% Scientists: Single year impact” for both 2020 and 2021.

His main research interests include: (1) Quaternary geology, marine geology and geochronology; (2) Coupling of Sea level, delta, fluvial system and land surface processes; (3) Mechanism of arsenic pollution in underground water associated with global climate change and sedimentology; (4) Luminescence dating in both application and technique development.

Abstract: Understanding the geological processes controlling geogenic arsenic (As) contamination in groundwater is crucial for management and mitigation of the problem. Based on our recent coring and dating results on Jiangnan Plain of the central Yangtze River basin, we herein propose a conceptual model arguing that present groundwater As contamination in Jiangnan is destined by interaction between sea level change and landscape evolution since the last ice age. Over the last ice age, the global sea level declined from a near-present level to the last glacial maximum (LGM, ~29-17 thousand years ago (ka)) low stand of ~130 m below, leading to headward erosion that could propagate over 1400 km upstream, forming incised valleys and interfluvial areas, leading to depletion of organic matter in pre-LGM sediments and formation of oxidized stiff clay capping the interfluvial areas, thus As mobilization in pre-LGM sediments was limited; afterwards, during the last deglaciation (~17-7 ka), rapid sea level rise induced fast filling of incised valleys by sandy sediments, which were coated with As bearing iron-

hydroxides (FeOOH) and interbedded with organic matter owing to an ameliorated climate; when sea level approached today's level at ~7 ka, decelerated sea level rise and landscape transformation due to valley filling gave rise to slow deposition of fine-grained sediments atop the fast valley fill, creating an anaerobic condition below, which in turn led to reductive dissolution of FeOOH and release of As. Therefore, the fast-infilling sediments deposited during the last deglaciation within the incised valleys became nowadays the major sources of high-As groundwater, while groundwater in pre-LGM sediments are generally As free. Evidenced by the published data, we derived that the conceptual model applies in many other regions around the world, as sea level change imposes worldwide influences on landscape evolution. Therefore, our proposal may provide a global solution for groundwater As contamination.

Keynote Speech 3: Fenton's and Activated Persulfate Oxidation Processes for Efficient Degradation of Synthetic Dyes



*Prof. Chih-Huang Weng
Chairman of Department of Civil Engineering,
I-Shou University*

Biography: Distinguished Professor Chih-Huang Weng is the Chairman of the Department of Civil Engineering at I-Shou University, Taiwan. He also served as Vice-President of North Kaohsiung Community University, Taiwan. Prof. Weng received his MS and Ph.D. degrees in 1990 and 1994, respectively, from the Department of Civil Engineering of The University of Delaware, USA. He is serving as the Editor of Water (MDPI) and Editor of Environmental Geochemistry and Health (Springer), and on the Editorial Board Panel Member of Coloration Technology (Wiley). He has also served as a Guest Editor of SCI journals, such as Agricultural Water Management (Elsevier) and Environmental Science and Pollution Research (Springer). He has also organized and chaired several international conferences. Professor Weng was listed in the World's Top 2% of Scientists (Stanford University, 2021 and 2022). His main research interests focus on using advanced oxidation processes and adsorption to treat wastewater and bacteria inactivation, groundwater modeling, and application of electrokinetic technologies to soil remediation/sludge treatment/activated carbon regeneration.

Abstract: Synthetic dyes, mostly toxic, mutagenic, and carcinogenic, are the largest colorants used in various industries, including textiles. If improper treatment occurs, the dye effluent from these industrial wastewaters could pose a serious environmental concern and public health awareness. Because of the complex aromatic molecular structure of synthetic dyes, most of them are highly resistant to biodegradation. Conventional biological treatment processes are no longer adequate for treating dye effluents. The implementation of wastewater discharge regulations promotes research on improving available technology and developing effective treatment processes to comply with increasingly stringent effluent standards. Fenton's and activated persulfate processes are the advanced oxidation technologies (AOTs) based on the production of oxidative active radicals, mainly hydroxyl radicals (HO•) and sulfate radicals (SO^{4•-}) during the catalytic reaction. These processes have an excellent reputation for treating recalcitrant organic compounds. The selection of a suitable catalyst and activator is of great importance. This presentation outlines the prospect of using Fe⁰ aggregates, Fe²⁺-rich minerals (Schorl, biotite, Mackinawite, and pyrite), and LaMO₃ (M = Co, Fe) Perovskites as the highly efficient catalyst in activating Fenton's reaction and persulfate for the treatment of textile dyes in aqueous solution. In addition, the use of ultrasound, heat, and UV₂₅₄/VUV₁₈₅ to enhance the robustness of these processes on the catalytic degradation of dyes is discussed.

Part III Poster Presentations

On-site Poster Presentation Guidelines

Materials Provided by the Conference Organizer:

- ✚ X Racks & Base Fabric Canvases
- ✚ Adhesive Tapes or Clamps

Materials Provided by the Presenters:

- ✚ Home-Made Posters
- ✚ Posters Printed by Conference

Requirement for the Posters:

- ✚ Material: not limited
Size: 160cm (height) ×60cm (width)



X-Rack

Online Poster Presentation Guidelines

- ✚ A collection of posters in PDF format (with/without audio) will be available at conference website for attendees to view starting on July 5, 2023.
- ✚ Signed and stamped electronic presentation certificate would be issued via e-mail after conference.

List of Posters

CEE1687	The Sustainable Development Model of Rural Domestic Sewage Treatment in China <i>Ms. Xinying Fan, Yellow River Engineering Consulting Co., Ltd</i>
CEE1693	Ecological Constraints to Match Field and Preferred Temperatures in Neotropical Brazilian Lizards <i>Dr. Thiago Maia-Carneiro, Department of Physiology, Institute of Biosciences, São Paulo University</i>
CEE1660	Coastline Change Monitoring by Remote Sensing in Coastal Zone of Bohai Bay in China <i>Mr. Hualiang Xie, Tianjin Research Institute for Water Transport Engineering</i>
CEE1677	The Progress and Management Suggestions for the Renovation and Restoration of Sea Area and Coastal Zone <i>Mr. Dawei Ji, National Marine Data and Information Service</i>
CEE1647	Research on the Application of EPC in China's Prefabricated Building Market: A Case Study of Shenzhen <i>Dr. Jiayin Zhou, Tianjin University</i>
CEE1680	Numerical and Theoretical Study on Shear Capacity of Segmental Joints in UHPC-RC Composite Beam Bridge <i>Mr. Jun Shen, Anhui Transportation Holding Group Co., Ltd</i>
CEE1689	Study on the Influence of Temperature Rise on the Stress Change of Prefabricated Cantilever Composite Subgrade (PCCS) <i>Mr. Xiaoxiang Cao, Anhui Transportation Holding Group Co., Ltd</i>
CEE1646	Impacts of Tibetan Plateau Vortex Activities on the Ecological Environment in the Yellow River Basin <i>Prof. Shuhua Yu, Chengdu Institute of Plateau Meteorology, China Meteorological Administration</i>
CEE1681	Building an Economic Argumentation Model for Vessel Train <i>Ms. Fangfang Jiao, China Waterborne Transport Research Institute</i>
CEE1695	Construction Technology of Tunnel Lining Vault Embedded Pipe Timely Grouting <i>Mr. Dongshan Zhang, No.1 Engineering Co., Ltd of FHEC of CCCC</i>
CEE1715	CEE1715: Numerical Investigation of Turbulence Models for Swirling Nitrogen/Air <i>Dr. Aoshuang Ding, China Shipbuilding Jiujiang Marine Equipment (Group) Company Limited</i>

Part IV Oral Presentations

General Guidelines

- ✚ All presentation times are shown in China Standard Time (GMT+8:00);
- ✚ Duration for Invited Oral Presentation: 25 Minutes of Presentation including 3-5 Minutes of Q&A;
- ✚ Duration for Regular Oral Presentation: 15 Minutes of Presentation including 2-3 Minutes of Q&A;
- ✚ All presenters are requested to reach the Session Room prior to the schedule time and complete their presentation on time;
- ✚ Presenters should prepare Power Pointer or PDF Files for Presentation with Paper ID (CEE****) marked in the last page;
- ✚ Signed and stamped electronic presentation certificate would be issued after presentation.

Offline Oral Presentation Guidelines

Devices Provided by the Conference Organizer:

- ✚ Laptops (with MS-Office & Adobe Reader) & Projectors & Screen
- ✚ Laser Sticks
- ✚ Microphones
- ✚ Please send us the PowerPoint once it is ready and have the PPT back up in a U-disk. For presenters who do not send the PowerPoint, please save it in the laptop of the corresponding session 15 min in advance. Kindly tell the Session Chair (before the start of your session) that you are present.

Online Oral Presentation Guidelines

- ✚ Online Oral Presentation will be conducted via Microsoft Teams Meeting.
- ✚ If a presenter is not able to show up via Teams, the session chair / conference secretary will play the pre-recorded video presentation during his/her scheduled presentation time, if listeners have questions about the presentation, please contact the conference secretary to forward the questions.
- ✚ If a presenter cannot show up on time or has problem with internet connection, the session chair has the right to rearrange his/her presentation, and let the next presentation start.

Best Oral Presentation Selection Procedure

ONE best presentation will be selected from EACH session based on the following criteria:

- ✓ Research Quality
- ✓ Presentation Performance
- ✓ Presentation Language
- ✓ PowerPoint Design
- ✓ Effective Communications

Selection Procedure

- An assessment sheet (see picture) will be delivered to listeners before the session starts;
- When the session finishes, each listener is required to fill the sheet (he/she can vote for two excellent presentations) and give it to the Session Chair;
- For the online presenters, the assessment sheet would be sent in advance via e-mail. Kindly send us the filled form in electronic version within ONE HOUR after the session completed;
- The Session Chair will count the votes and select one best oral presentation with more votes. If there is a tie, the Session Chair will make the final decision;

Best Oral Presentations Award

The Best Oral Presenter from each session will receive an official certificate and a free registration to the ACEER2024.

Sample of Assessment Sheet

ACEER 2023 Oral Presentation Assessment

Dear participants,

Thanks for your support. Kindly read the instructions below for best oral presentation selection:

- You could select two best oral presentations with this form, and kindly fill in the form when all the speakers finish the presentations;
- 3 Best Oral presentation would be selected separately from Session 1 to Session 3;
- To ensure the fairness of the selection, one person could fill in only one form, kindly fill in the form by yourself and fill in your paper/abstract ID;

You can refer to the following criteria for best oral selection:

Items	Assessment
Content	Right, Logical, Original, Well-Structured
Language	Standard, Clear, Fluent, Natural
Performance	Spirited Appearance, Dress Appropriately, Behaves Naturally
PowerPoint	Layout, Structure, Typeset, Animation, Multimedia
Reaction	Build a Good Atmosphere, Speech Time Control Properly

Please write down the paper ID and give reasons for your recommendation:

Paper ID	Reasons

Evaluated by: _____

Paper ID: _____

Note: Please fill it out and give it to the Session Chair or assistant so that the Best Oral could be selected.

Oral Session 1_ Environment Pollution and Wastewater Treatment

Time: 14:00-17:35, July 5, 2023

Location: Drawing Room (1F)

Session Chair: Assoc. Prof. Qian Wang, Department of Environmental Science and Engineering, Guangdong Technion – Israel Institute of Technology

Session Room Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

14:00-14:25	CEE1638	Statistical Forecast of Pollution Episodes in Macao During National Holiday and COVID-19 <i>Prof. Thomas Lei, Institute of Science and Environment, University of Saint Joseph</i>
14:25-14:40	CEE1697	Bimetallic Copper-Cobalt Quantum Dots Decorated on the Carbon Microtubes Derived from the Used Face Mask for Electrochemical Pollution Detection and Anti-Corrosion Applications <i>Mr. V P Krishnan, Department of Environmental Engineering and Management, Chaoyang University of Technology</i>
14:40-14:55	CEE1698	Bimetal (Ni, Co) Implanted in Cypress Biomass Derived N-Doped Carbon Biochar for Efficient Hydrogen Evolution Reaction and Pollution Detection <i>Mr. Moorthy Krishnamachari, Department of Environmental Engineering and Management, Chaoyang University of Technology</i>
14:55-15:10	CEE1685	A Sedimentological Perspective in Improving Predictive Modelling of Arsenic Polluted Groundwater Distribution <i>Mr. Yuexin Liu, Institute of Marine Sciences, Guangdong Provincial Key Laboratory of Marine Disaster Prediction and Prevention, Shantou University</i>
15:10-15:25	CEE1706	Influence of N-doped TiO ₂ /GO Composite as a Catalyst for Photocatalytic Degradation of PVA Solution under UV Light <i>Dr. Yen-Hsiang Wang, Institute of Environmental Engineering and Management, National Taipei University of Technology</i>
15:25-15:40		Coffee Break
15:40-15:55	CEE1707	Simultaneous Removal of Organic Pollutants and Hexavalent Chromium by Microbial Fuel Cells <i>Dr. Zhi-Da Lin, Institute of Environmental Engineering and Management, National Taipei University of Technology</i>
15:55-16:20	CEE1690	Catalytic Performance and Mechanism of Biochars for Dechlorination of Chlorinated Aliphatic Hydrocarbons in Sulfide Aqueous Solution <i>Prof. Na Liu, Department of Ecology, College of Life Science and Technology, Jinan University</i>
16:20-16:45	CEE1667	Chemical Mapping of Phosphorus (P) in Sewage Sludge Throughout Wastewater Treatment Plants for Efficient P Recovery <i>Assoc. Prof. Qian Wang, Department of Environmental Science and Engineering, Guangdong Technion – Israel Institute of Technology</i>
16:45-17:10	CEE1691	Fabrication of a Green Material Polymer Membrane Distillation with Enhanced Performance in Desalination Applications <i>Prof. Shiao-Shing Chen, Institute of Environmental Engineering and Management, National Taipei University of Technology</i>
17:10-17:35	CEE1696	The Test of Toxic Effect of Phoxim on Crucian Carp (<i>Carassius Auratus Gibelio</i>) by Using HE Staining, SEM and TEM Approach <i>Prof. Xiaoyu Liu, College of Food Science and Technology, Huazhong Agricultural University</i>

Oral Session 2_ Ecological Engineering, Environmental Engineering, and Energy

Time: 09:00-12:15, July 6, 2023

Location: Drawing Room (1F)

Session Chair: Prof. Zhenyu Yang, AAU Energy, Aalborg University, Esbjerg Campus

Session Room Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

09:00-09:25	CEE1694 Online	Distribution of Heavy Metals in Surface Sediments of Sebou Estuary, Moroccan Atlantic Coast <i>Dr. Soufiane Haddout, Department of Physics, Faculty of Science, Ibn Tofail University</i>
09:25-09:50	CEE1676 Online	Granular Activated Carbon as Fluidized Cathode to Enhance Electro-Fermentation for Caproate Production <i>Dr. Jingwei Ma, Department of Water Engineering and Science, Hunan University</i>
09:50-10:05	CEE1702	Research on Ecological Environment Impacts Assessment During the Construction Period of Railway Projects <i>Ms. Yitong Yin, State Key Laboratory of Remote Sensing Science, Faculty of Geographical Science, Beijing Normal University</i>
10:05-10:20	CEE1709	Methodology for Monitoring the Ecological Environment of Railway Construction <i>Dr. Yuying Zhang, State Key Laboratory of Remote Sensing Science, Faculty of Geographical Science, Beijing Normal University</i>
10:20-10:35	Coffee Break	
10:35-10:50	CEE1714	Analysis and Suggestions on Agricultural Non-point Source Pollution—Yongchuan District, Chongqing as an Example <i>Dr. Yanrong Lu, State Key Laboratory of Remote Sensing Science, Faculty of Geographical Science, Beijing Normal University</i>
10:50-11:05	CEE1683	Efficiency Enhancement of Solar PV Panel by Incorporating Wickless Loop Heat Pipes with Plate Type Evaporator <i>Dr. Nethaji N, Government Polytechnic College</i>
11:05-11:20	CEE1699 Online	Efforts to Address Submerging Areas due to Shrinkage and Tidal Flooding <i>Dr. Dian Nafiatul Awaliyah, Hasfa Institute</i>
11:20-11:35	CEE1713 Online	Microbial Communities Associated with Eelgrass (<i>Zostera Marina</i>) and Their Potential Colonization Source <i>Dr. Md Mehedi Iqbal, Atmosphere and Ocean Research Institute, The University of Tokyo</i>
11:35-12:00	CEE1712	Flood Forecast and Control for Urban Rivers Using LSTM Neural-Network <i>Prof. Zhenyu Yang, AAU Energy, Aalborg University, Esbjerg Campus</i>
12:00-12:15	CEE1711	Five Novel and Highly Efficient Endophytic Fungi Isolated from <i>Huperzia Serrata</i> Expressing Huperzine A for the Treatment of Alzheimer's Disease <i>Dr. Wenxia Han, Xi'an Medical University</i>

Oral Session 3_ Structural Engineering, Geological Engineering, and Sustainable Development

Time: 13:45-17:00, July 6, 2023

Location: Drawing Room (1F)

Session Chair: Prof. Chih-Huang Weng, Department of Civil Engineering, I-Shou University

Session Room Link: <http://www.academicconf.com/teamslink?confname=aceer2023>

13:45-14:00	CEE1679	First Master Permanenization Solution for Telecommunication Tower <i>Ms. Hastining Bagyo Astuti, PT Dayamitra Telekomunikasi Tbk (Mitatel)</i>
14:00-14:25	CEE1678	Decision Support on Maintenance Issues Through Predicting Highway Equipment Hourly Cost for Extra Works <i>Prof. Haiyan Sally Xie, Department of Technology, Illinois State University</i>
14:25-14:50	CEE1684	Application of Nano-Foam Concrete in Prefabricated Products and Cast-In-Place Projects <i>Dr. Xue Li, Institute of Applied Physics and Materials Engineering, University of Macao</i>
14:50-15:05	CEE1645	Study on Enhanced Oil Recovery Technology of Tight Reservoir Modified in Highly Deviated Well: A Case Study of the L183 Area in the Huaqing Oilfield Ordos Basin, China <i>Ms. Ce Wang, No. 10 Oil Production Plant, Changqing Oilfield</i>
15:05-15:20	CEE1653	Property Characterization of Shield Tail Sealing Grease for High Water Pressure <i>Prof. Deqian Wang, Beijing China Railway Advanced Material and Technology Co., Ltd</i>
15:20-15:35		Coffee Break
15:35-15:50	CEE1661 Online	Method for the Design of Local Temporary Buildings to Ensure the Sustainable Development of the Liquid Society <i>Dr. Stefania De Gregorio, Department of Civil, Building and Environmental Engineering, University of L'Aquila</i>
15:50-16:05	CEE1659 Online	Architecture and Techniques of Environmental Control of Climatic Colonies in Italy and Abruzzo <i>Dr. Eleonora Laurini, Department of Civil, Architectural Construction and Environmental Engineering, University of L'Aquila</i>
16:05-16:20	CEE1640 Online	A Review on Application of Soft Computing Techniques in Geotechnical Engineering <i>Mr. T. Vamsi Nagaraju, Department of Civil Engineering, S. R. K. R Engineering College</i>
16:20-16:45	CEE1665 Online	Monitoring of Bridges Damage Based on the System Transfer Function Maps from Sensors Datasets <i>Assoc. Prof. Wael A. Altabay, Department of Mechanical Engineering, Faculty of Engineering, Alexandria University</i>
16:45-17:00	CEE1700 Online	The Impact of Sustainable Finance on Regional Innovation Ecosystems <i>Dr. Dimitri Corpakis, Former European Commission (EU); Fellow, Regional Studies Association</i>

Part V Conference Venue

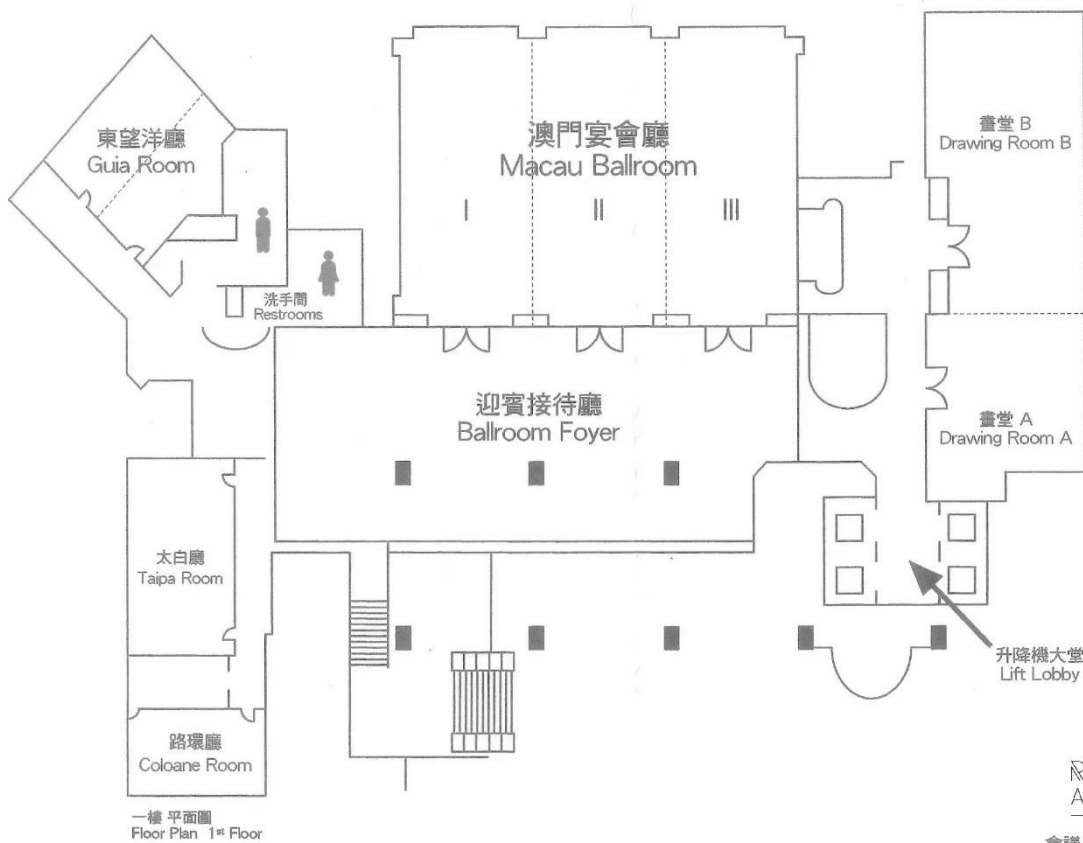
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 - About 4 KM
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 - Approx. 20 – 30 minutes by bus No. MT1
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 - About 10 KM
 - Approx. 20 - 30 minutes by taxi
 - Approx. 45 - 60 minutes by bus No. 25B or No. 25
3. Hong Kong- Zhuhai-Macao Bridge Frontier Port (港珠澳大桥澳门口岸) — Regency Art Hotel
 - About 16 KM
 - Approx. 30 - 35 minutes by taxi
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Part VI Acknowledgements

On behalf of the ACEER 2023 Organizing Committee, we would like to take this opportunity to express our sincere gratitude to our participants. We would also like to express our acknowledgements to the Technical Program Committee members who have given their professional guidance and valuable advice as reviewers. For those who contribute to the success of the conference organization without listing the name below, we would love to say thanks as well.

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Abstract Proceedings

Oral Session 1_ Environment Pollution and Wastewater Treatment

CEE1638: Statistical Forecast of Pollution Episodes in Macao During National Holiday and COVID-19

Thomas Lei^{1,*}, Joana Monjardino³, Luisa Mendes², David Gonçalves¹, and Francisco Ferreira³

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Abstract. Statistical methods such as multiple linear regression (MLR) and classification and regression tree (CART) analysis were used to build prediction models for the levels of pollutant concentrations in Macao using meteorological and air quality historical data to three periods: (i) from 2013 to 2016, (ii) from 2015 to 2018, and (iii) from 2013 to 2018. The variables retained by the models were identical for nitrogen dioxide (NO₂), and particulate matter (PM₁₀ and PM_{2.5}) but not for ozone (O₃). Air pollution data from 2019 was used for validation purposes. The model for the 2013 to 2018 period was the one that performed best in the prediction of the next-day concentrations levels in 2019, with a high coefficient of determination (R²) between predicted and observed daily average concentrations (between 0.78 and 0.89 for all pollutants), and low root mean square error (RMSE), mean absolute error (MAE), and biases (BIAS). To understand if the prediction model was robust to extreme variations in pollutants concentration, a test was performed under the circumstances of a high pollution episode for PM_{2.5} and O₃ during 2019 and a low pollution episode during the period of implementation of the preventive measures for the COVID-19 pandemic. Regarding the high pollution episode, the period of the Chinese National Holiday of 2019 was selected, in which high concentration levels were identified for PM_{2.5} and O₃, with peaks of daily concentration exceeding 55 µg/m³ and 400 µg/m³, respectively. The 2013 to 2018 model successfully predicted this high pollution episode with high coefficients of determination (0.92 for PM_{2.5} and 0.82 for O₃). The low pollution episode for PM_{2.5} and O₃ was identified during the 2020 COVID-19 pandemic period, with a low record of daily concentration for PM_{2.5} levels at 2 µg/m³ and O₃ levels at 50 µg/m³, respectively. The 2013 to 2018 model successfully predicted the low pollution episode for PM_{2.5} and O₃ with a high coefficient of determination (0.86 and 0.84, respectively). Overall, the results demonstrate that the statistical forecast model is robust and able to correctly reproduce extreme air pollution events of both high and low concentration levels.

Keywords: Air pollution, air quality forecast, modelling, pollution episodes, national holiday, COVID-19

Acknowledgements: The work developed was supported by The Macao Meteorological and

Geophysical Bureau (SMG).

CEE1697: Bimetallic Copper-Cobalt Quantum Dots Decorated on the Carbon Microtubes Derived from the Used Face Mask for Electrochemical Pollution Detection and Anti-Corrosion Applications

Krishnan Vancheeswaran Prasad^{1,2}, Mohanraj Kumar¹, and Jih-Hsing Chang^{1,*}

¹ *Department of Environmental Engineering and Management, Chaoyang University of Technology*

² *Department of Applied Chemistry, Chaoyang University of Technology*

*E-mail: changjh@cyut.edu.tw

Abstract. The rise of covid-19 had an unfathomable impact on society, leading to the widespread usage and discarding of face masks, particularly polypropylene face masks, because of their inexpensive cost. This study helps to repurpose discarded face masks into carbon material for future purposes. In this study, the face mask (FM) sample was assessed using the pyrolysis technique at various temperatures. The crystal structure and formation of the sample were examined using X-ray diffraction and scanning electron microscopy. The FM 900 has a good electrochemical feature, which is greater than the other sample in alkaline medium. As a forerunner to this effort, the microtube-based FM900 sample is now coated with cobalt-copper bimetallic composites. Several research has been proposed to learn more about the features and structures. Using the polarised Tafel plot studies it is proposed to study the anti-corrosion properties of prepared material as well as by DPV studies it is proposed to study the pollution detection behavior of our material. This effort will help to meet the environmental pollution detectors while also preventing corrosion in paints.

Keywords: Quantum dots, face mask, electrochemical detection, microtubes, anti-corrosion

CEE1698: Bimetal (Ni, Co) Implanted in Cypress Biomass Derived N-Doped Carbon Biochar for Efficient Hydrogen Evolution Reaction and Pollution Detection

Moorthy Krishnamachari^{1,2}, Mohanraj Kumar¹, and Jih-Hsing Chang^{1,*}

¹ *Department of Environmental Engineering and Management, Chaoyang University of Technology,*

² *Department of Applied Chemistry, Chaoyang University of Technology*

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Abstract. The core issue of ongoing research is generating Environmental-friendly clean fuels from renewable energy sources instead of detrimental Fossil fuels. Hydrogen is one of the clean, most promising, abundant and prominent energy resources in nature. While we are concerned about this, hydrogen production will be an alternative to fossil fuels and future energy crises. Electrochemical water splitting has been a facile and effective method of producing hydrogen. But the key issue is fabricating effective electrocatalysts material. While considering all the above concerns, constructing electrocatalytic material from waste biomass will be a double advantage. The Cypress tree is one of the most abundant trees in Taiwan and also in some parts of the world. Still, the utilization of waste biomass is another serious issue. So, the fabrication of catalysts from cypress leaf biomass would be a beneficial pathway. Due to the insufficient active sites, active surface area, and charge transfer efficiency it's not

enough to produce hydrogen. Thereby increasing above mentioned parameters through transition metal doping would be an effective and promising approach. In transition metals, Ni and Co facilitate rich surface functional groups, strong adsorption as well as desorption capacity, and large active surface area. Here we have synthesized, “Bimetal (Ni, Co) implanted in cypress biomass derived N-doped carbon biochar for efficient Hydrogen Evolution Reaction and pollution detections”.

Keywords: Biochar, bimetallic, cypress, HER, pollution detection

CEE1685: A Sedimentological Perspective in Improving Predictive Modelling of Arsenic Polluted Groundwater Distribution

Yuexin Liu, and Zhongping Lai*

Institute of Marine Sciences, Guangdong Provincial Key Laboratory of Marine Disaster Prediction and Prevention, Shantou University

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Abstract. Long-term ingestion of groundwater with unsafe arsenic (As) levels ($>10\mu\text{g/liter}$) is threatening the well-being of hundreds of millions of people worldwide. Though national/regional wide well water surveys have been launched to evaluate the magnitude of As pollution, these surveys are often subjected to temporal and financial limits and unable to offer a precise panorama. Over the past decades, several predictive maps have been imposed to pinpoint previously unknown areas of As pollution using statistical learning methods by correlating measured groundwater As data with relevant geospatial parameters. Among these parameters, “Holocene sediments” have been found to be strongly associated with As contamination. However, such association remains doubtful given the models' inability to perform effectively in specific domains, as demonstrated by failure of the China's risk map in identifying As-affected Jiangnan Plain in the middle Yangtze (China). We herein propose a geomorphology controlled As pollution model, which argues that, rather than Holocene sediments, high-As groundwater is in touch with sediments (so-called post-LGM sediments) deposited within paleo-incised valleys during the deglacial period after the last glacial maximum (LGM, $\sim 29\text{-}17$ thousand years ago (ka)). Furthermore, by replacing the “Holocene sediments” with the “post-LGM sediments”, the predictive ability of the model could be significantly enhanced, and areas like the Jiangnan plain are likely to be identified.

CEE1706: Influence of N-doped TiO_2/GO Composite as a Catalyst for Photocatalytic Degradation of PVA Solution under UV Light

Yen-Hsiang Wang, and Shiao-Shing Chen

Institute of Environmental Engineering and Management, National Taipei University of Technology

**E-mail: f10919@ntut.edu.tw*

Abstract. TiO_2 is a semiconductor material with photocatalytic properties. Its electron-hole pair recombination phenomenon is easy to occur. So, it is difficult to use it alone for photocatalytic reactions. Graphene oxide (GO) has a good charge transfer effect and can reduce the electronic recombination phenomenon, while nitrogen is the most effective element in non-metallic doping, which is used to shorten the energy gap of TiO_2 and strengthen the charge transfer effect of GO. Polyvinyl alcohol (PVA)

is a hydrophilic high molecular polymer, which is difficult to handle. Therefore, the current work investigation will use TiO₂ with nitrogen doping, which is carried out synchronously on GO, so that the nitrogen element has a synergistic effect on GO and TiO₂, expressed as N-TiO₂/GO catalyst. To explore the degradation effect of modified photocatalysts through the degradation of PVA. In the physical analysis of N-TiO₂/GO nanocomposites, PL analysis in the wavelength range of 300-700 nm showed that the recombination rate of electron-hole pairs has improved. UV-Vis-NIR analysis showed that the energy gap has reduced from 2.9 eV to 2.0 eV, and the excitation wavelength is red-shifted to 620 nm. the XRD analysis results show that TiO₂ is anatase crystal phase. N doping element can also be seen in XPS analysis, which is successfully doped on GO and TiO₂. BET analysis shows that the pore volume and size of N-TiO₂/GO are 0.44 cm³/g and 27.92 nm, respectively, and the specific surface area is about 63.75 m²/g. On analyzing, the batch photocatalytic degradation of the PVA reaction, using a single UVC lamp as the light source, and the N-TiO₂/GO catalyst concentration was 0.3 g/L, the composite catalyst showed the highest TOC degradation effect, the removal rate achieved 96.63 % after 6 hours of reaction. Furthermore, the reusability of the catalyst, after five photocatalytic reactions (6 hours/time) of N-TiO₂/GO, the TOC removal rate is maintained above 75 %, which is much higher than the removal effect of unmodified TiO₂. This proves the reusability of the catalyst and emphasizes the fact that nitrogen doping TiO₂ and GO not only improve photocatalytic performance but also show the prospect and application of renewable energy in the near future.

Keywords: Graphene oxide, nitrogen doping, titanium dioxide, photocatalysis, polyvinyl alcohol (PVA), total organic carbon

CEE1707: Simultaneous Removal of Organic Pollutants and Hexavalent Chromium by Microbial Fuel Cells

Zhi-Da Lin, and Shiao-Shing Chen

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Abstract. Conventional wastewater treatment is energy intensive as well as expensive Microbial Fuel Cell technology comes as a boon as it can simultaneously treat wastewater using bacteria as catalysts and also generate electricity. A dual-chamber microbial fuel cell equipped with a proton exchange membrane was used to study the simultaneous oxidation of tapioca bubble cooking wastewater and reduction of hexavalent chromium wastewater and to explore its power generation efficiency. Hexavalent chromium is a common toxic pollutant in the electroplating industry and can be converted to less toxic trivalent chromium or chromium hydroxide precipitation before discharge into the environment. At the anode chamber, oxidation of tapioca wastewater occurs while hexavalent chromium (Cr⁶⁺) gets reduced to Cr³⁺. For the first time, the effect of variation in pH (1.3, 1.5, 1.7) and HRT (9, 13, 26 h) was studied to simultaneously enhance the power performance removal, COD removal, and hexavalent chromium reduction. At pH of 1.3, and HRT of 26 h the carbon cloth anode-based MFC successfully achieved a maximum power density of 35.74 mW/m² while simultaneous the tapioca removal treating bubble wastewater with COD of 80.93%, CE of 21.56%, and hexavalent chromium reduction rate of 96.6%. This study shows the promising application of tapioca wastewater for future industrial applications.

Keywords: Microbial fuel cell, proton exchange membrane, hexavalent chromium, tapioca bubble cooking wastewater, simultaneous redox reaction

CEE1690: Catalytic Performance and Mechanism of Biochars for Dechlorination of Chlorinated Aliphatic Hydrocarbons in Sulfide Aqueous Solution

Na Liu

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Abstract. Biochars (BCs) have been investigated as a natural and economical activator to treat organic contamination. Compared with commercial carbon materials, BCs have a better prospect of large-scale application. For the first time, this study certified degradation of tetrachloroethene (PCE), trichloroethylene (TCE) and hexachloroethane (HEC) in sulfide-containing aqueous solutions catalyzed by BCs pyrolyzed at different temperatures. Interestingly, BC800 could catalyze PCE, TCE, HEC and dechlorination and form acetylene and chloride ion with over 99 % nontoxic transformation in neutral and alkaline pH conditions. Furthermore, materials surface properties, BC dosages and sulfide concentrations were considered as limiting factors for dechlorination, and the last one had the strongest influence. XPS analysis demonstrated that catalytic ability of BC was attributed to pyridine nitrogen (N6) on surface, because C and O adjacent to N6 strongly favor nucleophilic reactions. These results evaluated the applicability of degrading toxic chlorinated alkenes mediated by natural carbon materials in sulfide-containing environment.

CEE1667: Chemical Mapping of Phosphorus (P) in Sewage Sludge Throughout Wastewater Treatment Plants for Efficient P Recovery

Qian Wang^{1, 2, 3, *}, Nina Almind-Jørgensen⁴, Chitra S. Rajub⁵, Mikkel Laustrup⁶, Kasper Reitzel⁷, and Ulla Gro Nielsen^{1, *}

¹ *Department of Physics, Chemistry and Pharmacy, University of Southern Denmark*

² *Department of Environmental Science and Engineering, Guangdong Technion – Israel Institute of Technology*

³ *Department of Civil and Environmental Engineering, Technion*

⁴ *VandCenter Syd (VCS)*

⁵ *Billund Vand & Energi*

⁶ *Din Forsyning*

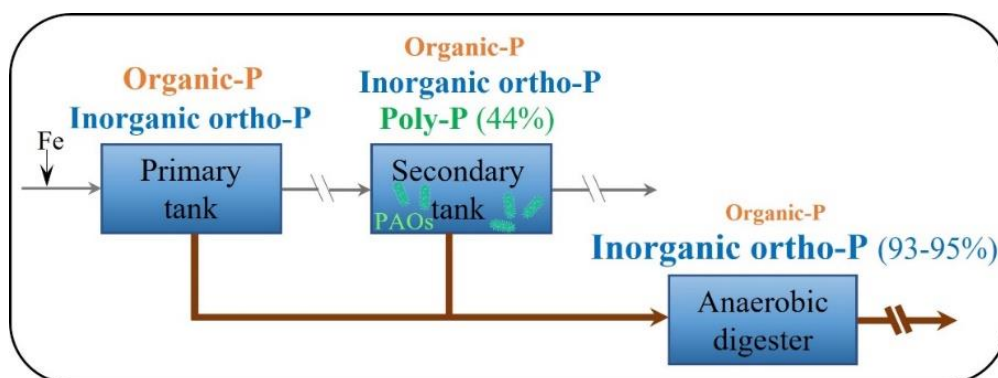
⁷ *Department of Biology, University of Southern Denmark*

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Abstract. Phosphorus (P) is a necessary element for all living organisms. However, phosphate rock, the primary source of P, is finite and will be depleted in a century. This makes it urgent to recover P from secondary sources, e.g., wastewater treatment plants (WWTPs). To provide insights into efficient P recovery from WWTPs, this study mapped the P speciation in the sludge throughout three WWTPs in Denmark, i.e., Ejby Mølle, Billund, and Esbjerg WWTPs. Our recently validated sequential P extraction protocol, which can quantify vivianite $\text{Fe}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$, was combined with a suite of analytical techniques such as optical microscopy, scanning electron microscopy coupled with energy

dispersive X-ray spectroscopy (SEM-EDS), powder X-ray diffraction (PXRD), and nuclear magnetic resonance (NMR). At Ejby Mølle WWTP, which used Fe-dosing chemical P removal and enhance biological P removal (EBPR), the primary sludge comprised of comparable inorganic orthophosphate (ortho-P, 53% of total P) and organophosphate (organic-P, 45%). The secondary sludge contained abundant polyphosphate (poly-P, 44%) formed by poly-P accumulating organisms during EBPR. However, the biogenic P (poly-P and organic-P) was degraded after anaerobic digestion, making inorganic ortho-P the dominated P in the downstream sludge (93-95%) with a bit organic-P. Fe-P, i.e., vivianite-P and Fe(III)-P, was the main inorganic ortho-P in all sludge samples, and it increased from 46% to 71% of total P by anaerobic digestion. Vivianite, a promising P recovery product which can be recovered from sludge by magnetic separation, was observed in the sludge after anaerobic digestion at high quantity with PXRD reflections (10-11 mg-P/g, 37-39% of total P). It was also found in all other sludge samples by microscopy and chemical extraction but not detected by PXRD. The PXRD amorphous properties of these vivianite particles may cause their overlook in sludge in previous studies. Similar trends of P variation were observed throughout Billund and Esbjerg WWTPs; but Al-P (P sorbed to amorphous Al hydroxides) was a P mineral phase as dominant as Fe-P (both 38%) in the downstream sludge at Esbjerg WWTP, which co-dosed Al and Fe.

Keywords: Sewage sludge, vivianite, P speciation, ^{31}P and ^{27}Al NMR, analytical chemistry



CEE1691: Fabrication of a Green Material Polymer Membrane Distillation with Enhanced Performance in Desalination Applications

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Abstract. Not Accessible.

CEE1696: The Test of Toxic Effect of Phoxim on Crucian Carp (*Carassius Auratus Gibelio*) by Using HE Staining, SEM and TEM Approach

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¹ *Huazhong Agricultural University*

² *Key Laboratory of Environment Correlative Dietology, Ministry of Education Wuhan*

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Abstract. The toxic effect of phoxim on crucian carp (*carassius auratus*) was investigated via Hematoxylin-Eosin staining (HE) combined with Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM) observation. The results of morphology identified by HE staining, SEM and TEM demonstrated that certain concentration phoxim could induce pathological damage of liver (drug metabolism organ), gill- (respiratory organ) and brain (nervous system) in crucian carp at tissue and cell level at different degree. The morphology results were more and more clear and persuasive with the approach used becoming more and more advanced from HE staining to SEM then to TEM. The experimental setup included a blank control group and a phoxim exposure group with semi static poisoning method. The exposure concentration was set to two dosage groups: high dose (0.33mg/L) and low dose (0.083 mg/L) with exposure time of 40 days and 60 days, respectively. Under these conditions, the HE staining observation results, as well as the SEM and TEM observation results were listed below: Compared with the control group, the liver, gills, and brain of crucian carp were damaged from pathology and morphology under the action of phoxim. The appearance of liver of crucian carp damaged was a disordered arrangement of liver cells, with honeycomb like damage and cell rupture; The appearance of gill of crucian carp damaged was: large area of epithelial cells shedding and cell deformation; The appearance of brain of crucian carp damaged was: the neurons in the hippocampus were loose and disordered, the neuronal body was deformed, some cell nuclear membranes were broken, and the nucleus was dissolved. The degree of damage to various parts showed a dose-effect relationship and a time-dependent relationship. The damaged effects of phoxim on the liver, gills, and brain tissues of crucian carp may be one of the mechanisms underlying its toxic effects on crucian carp and it is necessary for further research.

Keywords: Crucian carp, phoxim, hematoxylin-eosin staining, scanning electron microscope, transmission electron microscope, pathological damage

Acknowledgements: This work was supported by the National Natural Science Foundation of China (Grant No. 31471655, 31171694).

Oral Session 2_ Ecological Engineering, Environmental Engineering, and Energy

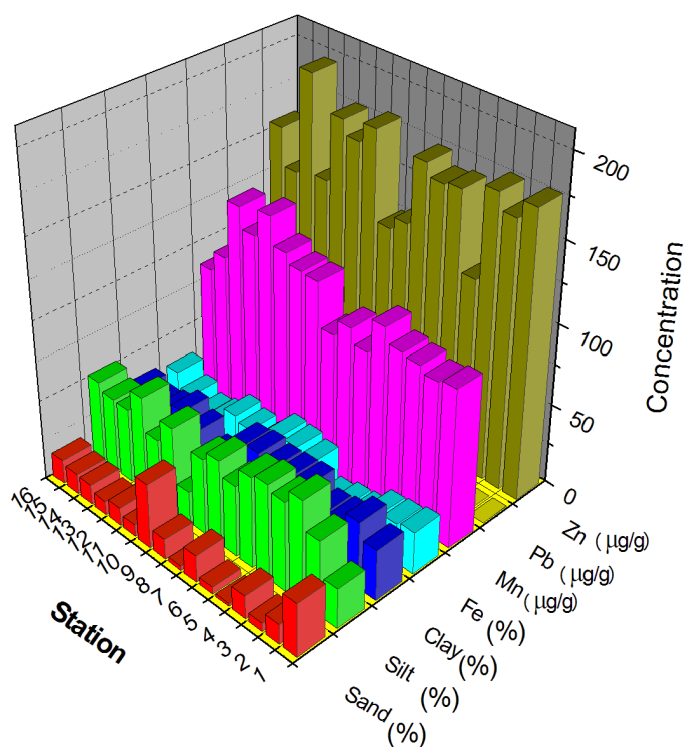
CEE1694: Distribution of Heavy Metals in Surface Sediments of Sebou Estuary, Moroccan Atlantic Coast

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Abstract: This presentation analyzed heavy metals: iron (Fe), manganese (Mn), zinc (Zn), and lead (Pb) on surface sediments and evaluated the role of sediment grain size and organic carbon (OC) in the distribution of metals. Sixteen numbers of surface sediment samples were collected during summer period of 2019 from Sebou estuary (Morocco). The dominance of fine-grained sediments (clay and silt) was noted in the study region. The organic carbon distribution indicates that they are brought in the surroundings of coastal areas. Correlation analysis clearly indicates that fine particles and organic carbon control the distribution of metals. The correlation coefficient for relationships between the metals shows a strong degree of association between the fine fractions. The significant correlations were evident for Zn and Mn ($r=0.66$), Mn and Fe ($r=0.70$). The correlations between OC versus Mn ($r=0.80$), OC and sand ($r=-0.70$), OC versus silt ($r=0.96$), OC and clay ($r=0.87$) were significant. The degree of correlation between metals and other major constituents is often used to indicate the origin of the metals. On the other hand, contamination levels of metals were examined by using geo-accumulation index (I_{geo}), and contamination factor (CF) which indicated the fact that the heavy metals were unpolluted to moderately polluted in the estuarine sediments.



CEE1676: Granular Activated Carbon as Fluidized Cathode to Enhance Electro-Fermentation for Caproate Production

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Abstract. The rapid consumption of fossil energy has caused increasingly serious energy shortage and environmental pollution problems worldwide, which also poses extra burden to carbon neutrality, and led to a frontier and hot issue aiming to realize the sustainable development of the environment and energy demand. A growing number of researchers have focused on the production of high-value bio-fuels from organic waste, such as ethanol and fatty acids, which are also precursors of renewable fuels and chemicals and deserve wider applications. Medium chain fatty acids (MCFA) production via chain elongation (CE) of carboxylic acids through a reversed β -oxidation pathway has been a great interest recently. MCFA have more excellent physical properties than volatile fatty acids (VFA) and methane with 6–12 C atoms, and the high hydrophobicity contribute to further processing and separation. Electro-fermentation (EF) is the application of bio-electrochemical system in traditional anaerobic fermentation, which can use inexhaustible and cheap cathode instead of hydrogen/ethanol/lactate as electron donor. Caproate production from volatile fatty acids (VFAs) through chain elongation processes in electro-fermentation is a sustainable and promising technique for organic waste recycling and resources recovery. However, the small surface area of working electrode is one of the main factors impeding the improvement of performance. Therefore, fluidized cathode via granular activated carbon (GAC) dosage was employed in this study to stimulate the electro-fermentation for enhanced caproate generation, and the relevant mechanism was revealed. Herein, the effects of different filling ratios of GAC (0, 3, 8, 13, and 18%) on electro-fermentation with three different types of electron donors (lactate, lactate and cathode, and cathode) were investigated. It proved that the cathode could serve as the sole electron donor in the fluidized cathode EF systems, which outcompeted lactate, and lactate and cathode with easier availability and higher cost effectiveness. Results showed that the fluidized cathode electro-fermentation systems achieved the best performance at a GAC filling ratio of 8% with cathode as the sole electron donor. The yield of caproate, carbon recovery rate and electron recovery rate were 2.1, 1.8 and 1.6 times higher than those without GAC, respectively. The electrochemical analysis also verified the highest electrochemical activity of the cathode biofilm and the relatively small internal resistance of the system. It was noted that the dominant bacteria on the cathode biofilm shifted from *Lactobacillus* to *Clostridia*, *Oscillibacter* and *Caproiciproducens*, which probably contributed to the caproate production via chain elongation process. This work would provide some insights into application of electro-fermentation for high value added caproate production.

Keywords: Electro-fermentation system, fluidized cathode, electron donor, caproate

CEE1702: Research on Ecological Environment Impacts Assessment During the Construction Period of Railway Projects

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Abstract. In recent years, with the rapid development of the national economy, China's railway construction industry has flourished, becoming the period with the most completed railway construction since the founding of the People's Republic of China. However, while greatly promoting the rapid development of regional economy, the construction of railway might lead to land occupation, vegetation destruction, changes in the natural environment within the construction area and the ecological environment along the line, and also might change the original landscape structure and ecosystem function, bringing certain pressure to the ecological environment. By establishing ecological environmental quality as assessment index system and taking Nanping-Longyan Railway as the study case, this study calculated the quality index of ecological environment and ecological environment assessment index of railway construction project during the construction period, and carried out classification and change analysis of the ecological environment status. The results showed as follows: the railway ecological environment quality index is continuously increasing, indicating that the engineering construction has a small impact on the ecological environment, standardized construction, and high environmental governance, boosting the continuous improvement of ecological environment quality. The purpose of this paper is to find out the real changes in the ecological environment in the process of railway construction, provide basic data for railway environmental protection, and evaluate the quality of railway ecological environment, in order to provide technical support for railway environmental management decision.

Keywords: Railway construction projects, construction period, Nanping-Longyan Railway, ecological environmental quality

CEE1709: Methodology for Monitoring the Ecological Environment of Railway Construction

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Abstract. As a linear project, the ecological environment along the railway construction project is complex and changeable, with a high proportion of tunnels and bridges, which makes ecological environmental protection management difficult and requires regular investigation and monitoring of the impact of construction on the ecological environment. Based on the characteristics of railway engineering, this study analyzes and summarizes the ecological environment monitoring scheme and technical methods during railway construction, and then puts forward relevant environmental protection measures. The results show that the ecological environment monitoring of railway construction is generally divided into four stages: preliminary investigation and analysis, monitoring sites, data collection and work results. The monitoring content from macro to micro, from ecosystem to plants, animals and

other specific indicators. The main monitoring methods include manual investigation, remote sensing monitoring, infrared trigger camera trap, etc. According to the specific ecological characteristics and ecological problems, the construction of a scientific and complete ecological environment monitoring program for railway construction is conducive to mastering the trend of the ecological environment change in the process of railway construction, and implement the environmental protection measures and construction project environmental protection policies more pertinently.

Keywords: Ecological environment monitoring, railway construction, ecosystem, wild animals and plants

CEE1714: Analysis and Suggestions on Agricultural Non-Point Source Pollution-Yongchuan District, Chongqing as an Example

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Abstract: Among various types of pollution, agricultural non-point source pollution, as an important component of water pollution, has received significant attention from countries around the world in the past forty years. Especially after the effectiveness of point source pollution prevention and control, agricultural non-point source pollution prevention and control has become an international problem, and the overall research on agricultural non-point source pollution prevention and control has also become a hot topic. The 14th Five Year Plan period is a period of in-depth promotion of agricultural non-point source pollution prevention and control, and China has also conducted many studies on agricultural non-point source pollution in recent decades. This study focuses on research and policies on agricultural non-point source pollution in recent years in China, and summarizes the existing problems in the field of agricultural non-point source, such as the lack of top-down full chain technology and a lack of comprehensive evaluation standards. At the same time, taking Yongchuan District, Chongqing as an example, the relationship between the concentration of major pollutants in the cross-section of non-point source pollution and rainfall, fertilizer and pesticide application, planting, and livestock and poultry breeding was studied and analyzed. Finally, the factors that need to be focused on in controlling agricultural non-point source pollution are proposed, and the governance work should be carried out based on the full chain technology of monitoring, tracing, calculation, governance, and management. The study proposes that the entire system of agricultural non-point source pollution needs to be improved and targeted policies should be introduced in order to provide basic support for the control of agricultural non-point source pollution, thereby improving the ecological environment and achieving sustainable ecological development.

Keywords: Non-point source pollution, agriculture, governance, policy suggestion

CEE1683: Efficiency Enhancement of Solar PV Panel by Incorporating Wickless Loop Heat Pipes with Plate Type Evaporator

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Abstract. With the advancement of civilization and hence the energy consumption, the need for exploring novel energy sources is also on the rise. Solar power generation is one of the fastest developing energy sectors in the world. The conversion efficiency of a solar cell decreases with increase in the temperature of the junctions. Our research study focuses to reduce the junction heat by incorporation of Loop Heat Pipes with Plate type Evaporator (WLHP-PE) to transport the heat generated from the panel to the ambient. The study showed that the temperature of the panel is reduced by 5 to 9 °C. A rolled bond evaporator plate is attached to the bottom of the panel which acts as evaporator part of Loop Heat Pipe (WLHP-PE). Acetone, which is the working medium, filled in the WLHP-PE in liquid state to the required level to absorb the heat generated at the bottom of the panel and becomes vapour. This vapour transports the heat to the condenser section of the loop heat pipe, which is immersed in water bath. There the heat it is rejected to the water due to which the working medium is again converted to liquid state. For the given operating conditions, the conversion efficiency of PV module is increased by 10 to 12 % without any external power supply.

CEE1699: Efforts to Address Submerging Areas due to Shrinkage and Tidal Flooding

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Abstract. Regions at risk of submergence due to shrinkage (land subsidence) and tidal flooding pose significant challenges in urban planning and design. This research aims to identify possible efforts to address these issues and ensure the sustainability of affected areas. This study utilizes a literature review approach to analyze concepts, theories, and practices related to the management of shrinkage and tidal flooding. The findings of this research reveal several efforts that may be undertaken to address these issues. Firstly, adaptive and responsive planning is crucial. Urban planning should integrate the risks of shrinkage and tidal flooding into all planning stages, from site selection to infrastructure design. This approach includes the use of advanced technologies such as predictive modelling and early warning systems to identify and respond to environmental changes. Secondly, infrastructure strengthening is a key step in addressing shrinkage and tidal flooding. This involves improving drainage systems, constructing levees and retaining walls, and implementing regular maintenance to reduce flood risks. Additionally, rehabilitation and structural reinforcement of affected buildings are also necessary. Thirdly, a participatory and inclusive approach should be adopted. Involving local communities, stakeholders, and experts in the planning and decision-making processes will ensure that implemented solutions consider their needs and aspirations. This can also help garner community support and strengthen local capacity to cope with risks. Lastly, environmental management and sustainable adaptation are crucial. This includes the preservation and rehabilitation of coastal ecosystems, the use of

green techniques such as water-resistant vegetation planting, and the reduction of greenhouse gas emissions to address climate change, which can exacerbate shrinkage and tidal flooding. This study concludes that addressing shrinkage and tidal flooding in submerging areas requires a holistic approach involving adaptive planning, infrastructure strengthening, community participation, and sustainable environmental management. This research can serve as a foundation for developing concrete strategies to tackle these challenges and ensure the sustainability of affected regions.

Keywords: Submerging area, shrinkage, tidal flooding, urban planning and design

CEE1713: Microbial Communities Associated with Eelgrass (*Zostera Marina*) and Their Potential Colonization Source

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Abstract. *Zostera marina* (eelgrass) is classified as one of the marine angiosperms and is widely distributed throughout much of the Northern Hemisphere. This study investigated the microbial community structure and diversity of *Z. marina* growing in Futtsu bathing water, Chiba prefecture, Japan. The purpose of this study was to provide new insight into the diversity of microbial communities in leaves of different ages, the root-rhizome of *Z. marina*, and the surrounding microenvironments (suspended particles, seawater, and sediment). The microbial composition of each sample was analysed using 16S ribosomal gene amplicon sequencing. Each sample type was found to have a unique microbial community structure. Leaf-attached microbes changed in their composition depending on the relative age of the eelgrass leaf. The member of the class Alphaproteobacteria (especially family *Rhodobacteraceae*) appeared most frequently on young leaves; however, Gammaproteobacteria (especially families *Oceanospirillaceae* and *Halomonadaceae*) became more dominant on older leaves, whereas root was dominated by the member of the class Delta-, Epsilon-, Gammaproteobacteria. Special attention was given to a potential microbial source of leaf-attached microbes. Microbial communities of marine particles looked more like those of eelgrass leaves than those of water samples. This finding suggests that leaf-attached microbes were derived from suspended particles, which could allow them to go back and forth between eelgrass leaves and the water column.

Keywords: *Zostera marina*, eelgrass microbiome, 16S rRNA gene, leaf age, suspended particles

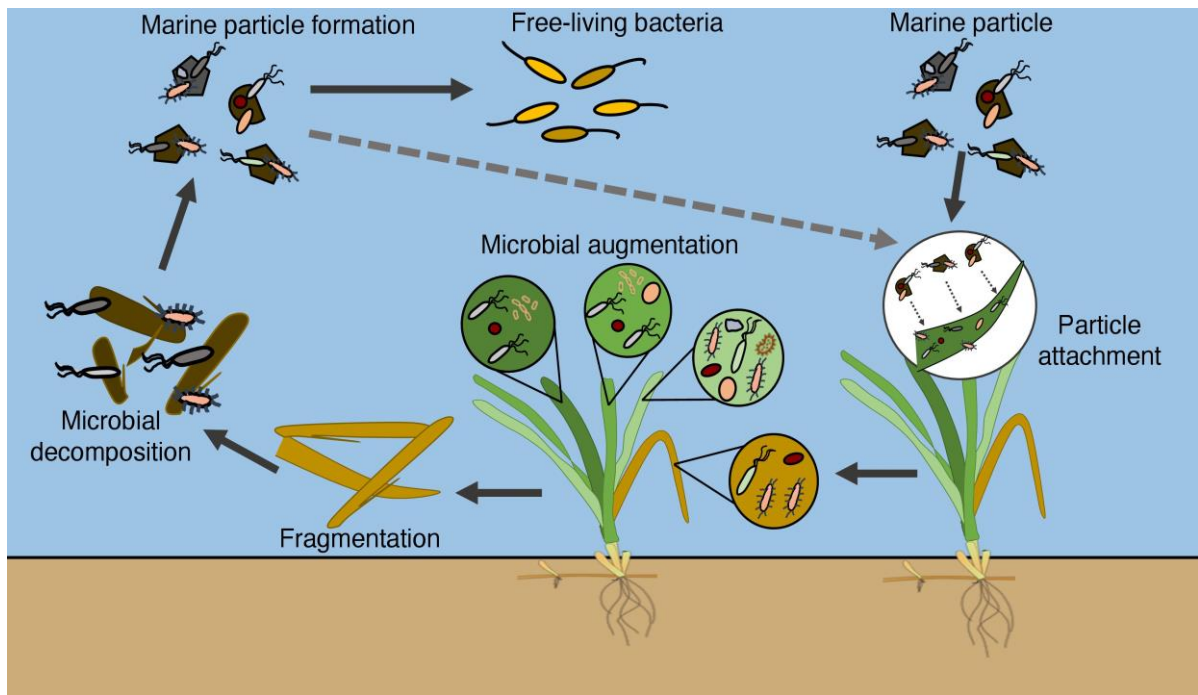


Fig: Conceptual diagram illustrating how marine bacteria are involved in the growth & decomposition process of eelgrass.

CEE1712: Flood Forecast and Control for Urban Rivers Using LSTM Neural-Network

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Abstract. To make better prediction and control of river water navigation in a Danish city - Vejle, the Long-Short-Term-Memory (LSTM) neural-network model is adopted and trained to predict the water level nearby a high flooding-risk area using correlated historical data. A set of feedback control solutions are developed based on the extension of the obtained LSTM model to automatically regulate a distribution-gate system, which guides the coming stream flow into separated urban rivers. The proposed control solutions are tested in simulation based on four historic events, and it can be observed that at least two floods at the critical areas since 2017 could have been prevented. This study demonstrates a clear and promising potential to use AI-based technologies for supporting development of smart cities and their climate adaption strategies.

Keywords: Urban rivers, flood prediction, LSTM, flood control

CEE1711: Five Novel and Highly Efficient Endophytic Fungi Isolated from *Huperzia Serrata* Expressing Huperzine A for the Treatment of Alzheimer's Disease

Wenxia Han

Abstract. Huperzine A (Hup A) is an important drug for treating Alzheimer's disease (AD) and mainly extracted from the *Huperzia serrata* (Thunb.) Trevis. (Lycopodiaceae) (HS). Nevertheless, the content of Hup A in HS is very low of 0.007% with growing circle of 8 to 10 years, and the chemical synthesis of Hup A still has some insurmountable limitations in the industrialized production. So, the available resources of Hup A for clinical treatment of AD are scarce. The purpose of this work was to construct a biosynthesis platform based on the endophytic fungi from HS. In this work, five endophytic fungi *Mucor racemosus* NSH-D, *Mucor fragilis* NSY-1, *Fusarium verticillioides* NSH-5, *Fusarium oxysporum* NSG-1 and *Trichoderma harzianum* NSW-V were firstly found and isolated from the Chinese folk medicine HS, which were identified according to their morphological characteristics and nuclear ribosomal DNA ITS sequences. The highest efficient fungus could effectively biosynthesize Hup A in a liquid culture of 319.8 ± 0.17 mg/L which were 112 times higher than that of other reported conventional endophytic fungi. Moreover, these fungi with higher hereditary stability could possess the initial expressing ability of Hup A after 40 generations, and the expressed Hup A from these biosynthesis systems has prior physicochemical properties, a better inhibition activity of acetylcholinesterase and a lower cytotoxicity compared to the listed active pharmaceutical ingredients (APIs) of Hup A. These results provide promising alternative resources for producing Hup A at an industrial scale by biosynthesis and it may also shed light on millions of AD patients.

Keywords: Huperzine A, Alzheimer's disease, *Huperzia serrata*, endophytic fungus, biosynthesis systems, highly efficient

Oral Session 3_ Structural Engineering, Geological Engineering, and Sustainable Development

CEE1679: First Master Permanenization Solution for Telecommunication Tower

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Abstract. Telecommunications development in Indonesia is growing rapidly, as it is in other emerging countries. With the expansion of this business, there is a very tight level of competition among Indonesian cellular operators as well as at the Tower Provider sector as a provider of supporting infrastructure services. Furthermore, the demand for infrastructure to support telecommunication systems has increased dramatically over the last decade, as has the need to erect more towers. As the consequences these two factors contribute to an increase in the demand for land to build the new tower. Need a solution to take advantage of the existing site, particularly the guyed mast tower, so that no new land is required. Novelty of this paper is presented the First Master solution developed by Mitratel, one of Indonesia's largest tower providers. This solution has been used in several locations and proved to use the existing guyed mast tower without turn off the tower transmission to ensure that the telecoms tower can still function.

Keywords: Telecommunication, tower construction, guyed mast, self-supporting tower, tower solution

Acknowledgement: PT Dayamitra Telekomunikasi Tbk (Mitatel).

CEE1678: Decision Support on Maintenance Issues Through Predicting Highway Equipment Hourly Cost for Extra Works

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Abstract. Typically, contractors rely on a data source like an online database or quotes from local rental agencies to estimate and calculate equipment costs. A difficulty with this practice is that they often need to purchase an annual subscription to the data source provider, which burdens them. Specifically, it concerns contractors who work on a small number of projects annually. While significant research on equipment hourly cost estimation was reported, research on extra work costing was limited. The proposed research aims to demonstrate the usage of decision trees to estimate the hourly equipment cost, which contractors can use in place of a commercial database during extra work. This study developed a costing model for three standard highway construction equipment (trucks, graders, and excavators). The data for this research was collected from the US Army Corps of Engineers' construction equipment schedule and local rental agencies to develop the cost model. This study's costing model will give the hourly ownership and operating costs once the user provides the equipment manufacturer, horsepower, and purchase year for the types of equipment. The originality of this research is pursued

through a comparison of the Hidden Markov Model (HMM), Deep Knowledge Tracing (DKT), and neural networks for user modelling. One significant outcome is the establishment of the priority hierarchy of equipment features using both decision trees and user evaluation. The predicted model costs statistically agree with the actual costs (R-Squared value > 90%). Thus, the proposed approach can be extended to create costing equations for other highway equipment. Another noteworthy finding from the results is that contractors, engineers, and suppliers should pay attention to the differences in equipment cost models, which are affected by not only ownership but also horsepower, fuel consumption, and maintenance needs.

CEE1684: Application of Nano-Foam Concrete in Prefabricated Products and Cast-In-Place Projects

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Abstract. The speaker will use two examples of industrialized technology inventions to describe how to effectively combine and apply the two different disciplines of chemistry and civil engineering to the research and development of various composite materials, and talk about the stories of commercializing the research products. (1) Use cement as raw material to produce nanoparticles (size <5 nm), and use them to prepare a series of hydrogels with super elasticity, adsorption and water swelling properties, and develop their applications in engineering, electronics, biological materials, environment and other fields. (2) Low-cost, nanoparticle-stabilized foam that can keep stable for years, which could be used to mix with cement paste to prepare lightweight, high-strength, fire-resistant and thermally insulated foam cement. The product was widely used in fabricated lightweight wall panels for energy-efficient buildings.

CEE1645: Study on Enhanced Oil Recovery Technology of Tight Reservoir Modified in Highly Deviated Well: A Case Study of the L183 Area in the Huaqing Oilfield Ordos Basin, China

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Abstract. Chang 6 sandstone reservoir in Huaqing oilfield is a typical tight reservoir. The whole reservoir presents the characteristics of obvious non Darcy seepage, widespread development of natural fractures, large proportion of low production and low efficiency wells, and low production of single wells developed by conventional vertical wells. Based on the mechanism of highly deviated wells improving oil production rate, aiming at the problems of low recovery degree and fracture development induced by water injection during the development of tight reservoirs, this paper verifies the feasibility and superiority of highly deviated wells in tight reservoirs through indoor numerical simulation and field actual effect evaluation. The research results indicate that: (1) The highly deviated wells in the study area adopt advanced fine layered water injection development method, and the regional formation pressure is maintained at a level of over 120%. By utilizing the role of closed well infiltration

and displacement, the seepage range is increased and the oil recovery rate is significantly improved. (2) Through numerical simulation combined with actual field test results, it has been proven that the concept of reducing the number of fracturing sections by combining cost control in highly inclined well areas, and the optimal perforation control degree is achieved at 10-20 meters per well, with a reasonable flow to saturation ratio of less than 1.0, can maximize the benefits. It is concluded that the development of highly deviated wells in the L183 area of Huaqing oilfield provides strong support for the optimization design of fracturing parameters of thick reservoirs with tight interlayer, and provides theoretical guidance and technical support for their field application.

Keywords: Tight reservoir, imbibition oil recovery, highly deviated well, enhanced oil recovery

CEE1653: Property Characterization of Shield Tail Sealing Grease for High Water Pressure

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Abstract. The shield tunnelling in high water pressure (0.4~ 0.8 MPa) when crossing the rivers in China is monopolized by imported shield tail sealing grease. Through orthogonal studies, the interaction of the sealing grease's components is investigated to address this issue. The findings reveal the following: (1) By introducing a thickening rheological agent, the formula creates a lamellar structure with layers spaced 5 ~ 10 nm apart, giving base oil and polyisobutylene access space. This allows for the realization of thickening and dispersion, improves the shear rheology of shield tail sealing grease under high water pressure, and ensures the balance between consistency and pumpability. (2) By adding various scales of naturally degradable fibers and other ingredients to the formula, a composite reinforced water resistance structure is created, resulting in 7 MPa water breakdown pressure of high-water-tightness pressure sealing grease, which is 1.75 times as much as the imported product. As a result, the reasonable consistency, and pumpability of shield tail sealing grease are achieved, and the water tightness is also significantly improved. It has laid a solid foundation for the further research, development, and transformation of high-end shield tail sealing grease for shields in high water pressure and complex strata such as river crossings in China.

Keywords: Shield tail sealing grease, water-tightness under high pressure, pumpability, water breakdown pressure

CEE1661: Method for the Design of Local Temporary Buildings to Ensure the Sustainable Development of the Liquid Society

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Abstract. "Liquid modernity" with its continuous and rapid change and the need to safeguard the environment, which is severely compromised by anthropogenic action, find an answer in local impermanence, that is, the art of designing and implementing man-made spaces conceived for a specific time, which arise from the peculiarities of the place, coexist in synergy with the local environment and return to it at the end of the time of use. A metabolism thought out at the design stage, in which the characteristics of compatible places are predefined for the "birth" and "death" of the building organism. The paper describes the method for the design and realization of local temporary building organisms, defining a three-stage process analysis of local potential, identification of requirements, design stage, guarantors of the compliance of the construction process with both the dynamic lifestyle of modern man and the sustainability of the intervention. The project is the result of analyses that start from the area allowing its promotion and sustainable development, and at the same time the environmental and economic cost of the building intervention is reduced. A benefit therefore for both the community and the individual, in a scalar and cyclical process guaranteeing that sustainable development capable of involving environmental, economic and social aspects. The methodology described is verified through a case study in the territory of L'Aquila (Italy): the design of a temporary building organism that can be used either to upgrade an existing building or in constrained or emergency contexts.

Keywords: Liquid architecture, local temporariness, reuse, sustainable development, local supply chain

CEE1659: Architecture and Techniques of Environmental Control of Climatic Colonies in Italy and Abruzzo

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Abstract: The climatic colonies are a new typology of buildings, an unprecedented synthesis of health and educational structures, promoted by the National Fascist Party for the care and training of young people with the aim of physically and mentally "shaping" the new Italian, from the very early childhood. The buildings are complex "sanitary machines", using distribution and construction solutions based on studies and experience gained since the 19th century to make buildings for the healthy treatment of tuberculosis and lung diseases (hospices and sanatoriums). The contribution starts with a study of the architectural, typological and construction characteristics of colonies, located in both marine and mountain environments, and focuses attention, in particular, on two of those built in Abruzzo in the 1920s during the Fascist Fascist period. The original functioning of the two buildings will be investigated, as well as the effectiveness of the solutions adopted to achieve internal comfort and the building-environment relationship. This study is aided by computer simulations. These themes are fundamental for guiding the recovery of this type of existing structure, and also consider recent and continuing climate change to which the entire planet is subjected.

Keywords: Climatic colonies, comfort indoor, thermo-hygrometric

CEE1640: A Review on Application of Soft Computing Techniques in Geotechnical Engineering

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Abstract. Numerous test results, mathematical relationships, and in-the-moment analysis and design are all components of geotechnical issues. Additionally, due to smart infrastructure and materials, the research trend in engineering nowadays is shifting toward intelligent tools and their ability to tackle engineering problems. Artificial neural networks (ANN), support vector machines (SVM), genetic algorithms (GA), and particle swarm optimization algorithms (PSO), among other soft computing techniques, have made significant progress in recent years in solving geotechnical issues. Based on a review of more than 800 published research, this study discusses the applicability of soft computing techniques in the current environment. Traditional methods, such as regression analysis and trial-and-error techniques, take time and could be more effective. Additionally, most geotechnical designs require considerable experimental data and may require laborious work. A novel methodology for soft computing approaches has emerged to solve the problems mentioned above. This paper presents soil problems and geotechnical challenges while examining recent developments and the potential applications of soft computing.

Keywords: Artificial intelligence, soft computing, geotechnical engineering, modeling

CEE1665: Monitoring of Bridges Damage Based on the System Transfer Function Maps from Sensors Datasets

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Abstract. To ensure the normal service of the bridge, it is necessary to detect and evaluate the health status of the bridge structure. This work provides a novel framework for damage detection in trusses bridges through analyzing of displacement sensors datasets and plotting the frequency maps of bridge system transfer function (TF). First, the bridge finite element model under random load is analysis, and the cumulative damages are considered and introduced to bridge model. The datasets of the sensors installed in bridge are compiled in both static and transient types. Finally, the bridge structure TF is determined by applying the principles of open loop control system on bridge structure and then plotting

the frequency maps. The results show that the system becomes unstable in frequency maps when damage evolves in bridge structure.

Keywords: Bridges structure systems, damage detection, displacement, open loop system, transfer function, frequency analysis

CEE1700: The Impact of Sustainable Finance on Regional Innovation Ecosystems

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Abstract. Fifty (50) years after the publication of the ‘*Limits to Growth*’ (1972) report by the Club of Rome, the concept of sustainability has become the undeniable intellectual framework underpinning most of human activities that aspire to a balanced economic development, respectful of the planet and its future. This applies also to global finance that has seen ESG (Environmental, Societal, and Governance) aspects gradually rising in importance and actually getting a boost from international regulators such as the European Commission. Sustainable finance is now on the rise with significant integration in the markets as well as in development funding mechanisms. As such it is impacting funding priorities with particular emphasis on national and regional (sub-national) ecosystems. The aftermath of the global pandemic as well as the implications of the return of war in Europe, have made innovation one of the core components of resilience for national and regional economies. As it is widely recognized, regional (sub-national) innovation ecosystems hold the promise of responding the better to economic crises by re-organizing and re-configuring the economic landscape, largely in systemic ways (bottom-up). Innovation clusters and hubs provide often the main resistance line to economic decline and can become serious rebound factors for local economies. This policy presentation will review the different aspects and components that made sustainability a core feature of global finance with a particular focus on its impact on regional (sub-national) innovation ecosystems and will provide a preliminary assessment for its overall impact and future trends. We will pay particular attention to the case of the European Union, where sustainable finance has been making strands for the last few decades and has recently acquired top importance with the *NextGenerationEU* post-pandemic recovery initiative, where green conditionalities abound. The presentation will be articulated around the following axes: (1) The Concept of Sustainability in a new geopolitical context. (2) Sustainability and the Impact of Global Finance. (3) Definition and Principles of Sustainable Finance. (4) Regional innovation ecosystems, global value chains and sustainable finance. (5) Sustainability and Sustainable Finance in the context of the European Union. (6) A Framework for future action on Sustainable Finance and the regions, mobilizing the Quadruple Helix.

Keywords: Sustainable finance, sustainability, innovation, regional innovation ecosystems

Poster Session

CEE1687: The Sustainable Development Model of Rural Domestic Sewage Treatment in China

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Abstract. With the successive promulgation of rural environmental governance policies in China, rural sewage treatment has become a hot topic. In response to the problem of traditional unified sewage collection and treatment model being difficult to adapt to in rural China, this article systematically investigates academic literature and engineering projects in China since 2000. The main problems existing in the existing rural governance are: the design scale of the project is too large; the water quality of the project inlet design is too high; the sewage pipe network is blocked and damaged; the sewage treatment facilities are not acclimated to the local conditions. Therefore, this article proposes a new model of rural sewage treatment and resource utilization that is ‘source separation, classified discharge, qualitative treatment, and recycling’, and provides three utilization scenarios and suitable technologies. In addition, it also explores the economic performance of this new model. The new sewage treatment concept proposed in this study will provide reference for further improving the rural sewage treatment rate in China.

Keywords: Rural domestic sewage, treatment model, rural environment, domestic sewage, China

CEE1693: Ecological Constraints to Match Field and Preferred Temperatures in Neotropical Brazilian Lizards

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Abstract. We compared microhabitat and body temperatures in the field with thermal preferences of *Tropidurus catalanensis* to investigate if they match or diverge as demonstration respectively of suitability or poor-quality of the thermal environment. As *T. catalanensis* is subjected to variable thermal conditions along its distribution and may be jeopardized by the climate change, we measured its thermal preferences after exposure to cooler (17 °C–27 °C) and warmer (22 °C–32 °C) thermal conditions to evaluate acclimatory responses and tolerances and vulnerabilities to warming. Microhabitats in the field tended to be cooler than all measures of thermal preferences [preferred body temperature (T_{pref}), set-point range body temperature (T_{set}), and voluntary thermal minimum (VT_{min}) and maximum (VT_{max})]. Field body temperature was similar to VT_{min} and cooler than the remaining measures of thermal preferences (i.e., T_{pref} ; T_{set} ; VT_{max}). Therefore, *T. catalanensis* was constrained to warming

up in nature. The VT_{min} may be a threshold separating proper functioning from markedly noxious impacts due to progressive impairment by the cooling. Difficulties to warm and keep suitable body temperatures may jeopardize overall ecophysiological and behavioral processes with implications for maintenance, fitness, and survival. The constraints to warm may impact *T. catalanensis* differently depending on its body size and its properties of heat conservation (thermal inertia). Smaller and larger *T. catalanensis* may respectively cool down easier and have difficulties to warm up, being jeopardized by the constraints due to the cold. The warmer preferred body temperatures coupled with the cooler microhabitats and bodies in nature complicate to anticipate how individuals will respond to climate change, but the exposure to the warmer temperatures led six of them to death, suggesting they had limited tolerance to heat and would be vulnerable to global warming.

Keywords: Climate change, thermal biology

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CEE1660: Coastline Change Monitoring by Remote Sensing in Coastal Zone of Bohai Bay in China

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Abstract. Coasts are the zone between the sea and the land, influenced by the dual effects of the exchange of materials between land and sea. It is an important reference for sea and land changes that reflect climate change and human activities. Monitoring shoreline changes has become an important task in the ecological environment protection, economic development of the bay. In this paper, coastline changes, bay area and shoreline characteristics of Bohai Bay in northern China were investigated over a 40-year period using multi-dated Landsat TM/ETM satellite image data from 1975 to 2015. The results show that the total coastline length of Bohai Bay increased by 761 km in the past 40 years, but the bay area showed a decreasing trend, which decreased by 18%; the artificial coastline showed a clear increasing trend year by year, while the natural coastline change was relatively weak and acutely disappeared. More than 95% of the coastline's length was made up of artificial coastline along Bohai Bay; the factors influencing the shoreline change of Bohai Bay had significant temporal heterogeneity, and then the leading factor was the anthropogenic development activities (reclamation engineering and port construction), mainly concentrated in the three key regions of Caofeidian Port, Tianjin Port and Huanghua Port in Bohai Bay. With the expansion of development and exploitation of marine activities,

the impact of human activities on the evolution of coastal zone is becoming more and more obvious, according to an analysis of the change of the bay coast and the bay area under the influence of hydrodynamic, sedimentary, and natural evolution environment. The study reveals the characteristics and influencing factors of coastal change in Bohai Bay, which can provide the necessary scientific basis for the development and construction, comprehensive management and coastal environmental protection of the Bohai Bay region.

Keywords: Bohai bay, remote sensing, coastline change, human activities, reclamation project

CEE1677: The Progress and Management Suggestions for the Renovation and Restoration of Sea Area and Coastal Zone

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Abstract. In recent years, the central government has invested in supporting 74 coastal zone renovation and restoration projects through sea area use funds, achieving a series of significant results. However, there are some problems such as a lack of comprehensive planning, incomplete management systems, unscientific implementation plans for some projects, and delayed implementation progress as well. Given the current progress and management status of coastal zone renovation and restoration projects, the article recommends the marine administrative departments to establish a management system, strengthen project supervision during and after the event, scientifically formulate and strictly implement renovation and restoration plans, broaden funding channels for renovation and restoration projects, innovate incentive mechanisms for renovation and restoration projects, promote the informatization construction of renovation and restoration project management, and proposed the ecological restoration concept of giving priority to natural restoration to promote the construction of marine ecological civilization and the development of marine economy in coastal areas.

Keywords: Sea area and coastal zone, renovation and restoration, marine ecological and environmental protection

CEE1647: Research on the Application of EPC in China's Prefabricated Building Market: A Case Study of Shenzhen

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Abstract. The EPC has experienced rapid development in China over the past 10 years, having completed several experimental projects and entered the promotion phase. Notably, the development of EPC in Shenzhen has been particularly outstanding. This study has compiled and analyzed the overall

situation of promoting EPC engineering general contracting in Shenzhen's prefabricated building industry. A total of 85 prefabricated building projects involving the largest prefabricated construction company in Shenzhen were selected, and their construction area, prefabrication rate, and other indicators were analyzed. For one thing, a comparison was made with the overall distribution of prefabricated building projects in Shenzhen. For another thing, a comparison was made based on the time and regional distribution. Furthermore, rational thinking was applied to analyze the development of Shenzhen's prefabricated building market, and reference suggestions were provided for the industry's development through discussion.

Keywords: EPC, prefabricated building, Shenzhen, construction industry

CEE1680: Numerical and Theoretical Study on Shear Capacity of Segmental Joints in UHPC-RC Composite Beam Bridge

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Abstract. Excellent shear performance of Ultra-High Performance Concrete (UHPC) beam segmental joints is dependent on the shear keys. To investigate the shear performance of segmental joints, the existing shear capacity prediction equation were evaluated based on the design of a bridge. Moreover, a refined finite element model (FEM) of UHPC beam bridge segmental joints was established and discussed in detail. The obtained results shown that the shear capacity predicted value of Chen equation is 57% and 18% lower than AASHTO and JSCE codes, indicating that Chen equation can predict the shear capacity of UHPC joints safely. By developing a refined model of the segmental joints, the loads it bears in different directions are calculated. Both tensile and compressive stresses are small, which satisfies the requirements of basic combination loads and ensures the safety of the structure.

Keywords: Ultra-high performance concrete (UHPC), shear keys, shear performance and capacity, finite element analysis, predictive equations

CEE1689: Study on the Influence of Temperature Rise on the Stress Change of Prefabricated Cantilever Composite Subgrade (PCCS)

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Abstract. In this paper, a new type of precast cantilever composite foundation structure for mountainous highway is studied, and the influence of temperature rise on the stress of the structure is analyzed. Under the load of temperature rise, the stress state of the PCCS structure is significantly improved, and its value is greater than the stress of the structure under static load. The temperature load mainly has

great influence on the stress state of the connecting steel bar and bolt, but has little influence on the concrete members. The stress state of the connected steel bar and bolt under the global temperature rising case has little difference with that under the local temperature rising case, while the stress state of the concrete members under the global temperature rising case is greater than that under the local temperature rising case.

Keywords: PCCS, global temperature rising, local temperature rising

CEE1646: Impacts of Tibetan Plateau Vortex Activities on the Ecological Environment in the Yellow River Basin

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Abstract. The Tibetan Plateau vortex (TPV) is the main rain-producing system over the Tibetan Plateau. Once it moves out of the plateau, it can cause heavy rainfall and even lead to flooding, soil erosion, and other impacts on the ecological environment to the east of the plateau, especially in the Yellow River Basin (YRB). Based on sounding data, ground-based observations and Tibetan plateau vortex (TPV) and shear line yearbooks from 1998 to 2018, and using synoptic analysis and statistical analysis methods, the activities and the precipitation of high-influence Tibetan Plateau vortices (HITPVs) activities and their impact on the ecological environment in the YRB are analyzed. The results indicate that the Tibetan Plateau vortices (TPVs) that did not move out of the plateau brought moderate rain and above to the upper reaches of the YRB in 1998 which are beneficial to enrich the water resources of the "water tower" of the YRB. Most of the moving-out TPVs (MTPVs) in 1998 caused moderate rain and above in the upper-middle reaches of the YRB or in the whole YRB, contributing to the enrichment of the water resources of the "water tower" of the YRB. However, the activities of the MTPVs were likely to cause heavy rainfall such as rainstorms and heavy rainstorms, which could result in local flooding and other natural disasters and damage to the local ecological environment in the middle reaches of the YRB. The HITPVs mostly moved eastward and northeastward during late May to mid-August, mainly affecting the middle or lower reaches of the YRB. In addition, these HITPVs had southeastward paths, spinning in the Hetao region. The HITPVs with eastward paths and spinning in the Hetao region influenced the whole YRB, mainly causing rainstorms and heavy rainstorms in the middle or lower reaches. All of the HITPVs resulted in damage to the local ecological environment of the YRB.

Keywords: Tibetan plateau vortex, Yellow River basin, ecological environment

CEE1681: Building an Economic Argumentation Model for Vessel Train

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Abstract. Vessel train has emerged as an innovative mode of transport organization and also as an intelligent ship-navigating technique. In this paper, we focus on the economic efficiency of vessel train for inland shipping and analyze the influence factors of economic efficiency. Based on the current situation of inland waterborne transport in China, we build an economic argumentation model for vessel train in inland waterways. Then, a case study is performed for the fairway along the Yangtze River trunk line that extends from Wuhan to Shanghai in the middle and lower reaches. The economic efficiency of the vessel train is estimated, and a sensitivity analysis is conducted for crew salary, identified as an important influence factor of economic efficiency. The results show that intelligent platooning cannot dramatically reduce the operating cost of vessel train under the current average crew salary in China. But as the crews' salary continues to rise, vessel train is bound to have a bright prospect in the future.

Keywords: Inland waterways, vessel train, economic argumentation

CEE1695: Construction Technology of Tunnel Lining Vault Embedded Pipe Timely Grouting

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Abstract. In order to solve the grouting problem of tunnel lining vault cavity and local uncompacting, based on the project example of Qing-Shiling tunnel and Yin-Dongxia tunnel of Baoping Expressway, combined with the existing tunnel vault grouting construction technology, a construction method of embedded pipe grouting for tunnel lining vault is proposed, and the key construction technology and the best parameter index of pipe grouting are given. The engineering practice proves that the grouting method has good construction effect and can provide technical reference for similar tunnel lining defect treatment construction.

Keywords: Tunnel engineering, vault cavity, embedded heel tube, timely grouting, key technology

CEE1715: Numerical Investigation of Turbulence Models for Swirling Nitrogen/Air

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Abstract. In this paper, different turbulence models are researched by simulating a non-reactive swirl flow of the non-premixed cyclone burner in comparison with the experimental results. Based on the velocity analyses, obvious recirculation region (CRZ) and jet region (SJ) exists in the experiments and influences the swirl flow. However, the laminar flow model, SST k-w, standard k-w cannot simulate these two vital regions as same accurate as the RNG model, especially for the declination angles.

Comparing the axial velocity curve and tangential velocity curve, it is found that the axial and tangential velocity peaks and trough position and velocity magnitude of the RNG k- ϵ model are the closest to the experimental results, which can fully predict the swirl characteristics. By RNG model simulating swirl flow, the structure of the vortex is fully represented, and the CRZ and SJ at the burner outlet are well captured. Thus, the RNG model is most suitable for the swirl flows. As the flow field is strongly influenced by flow instability, based on the simulation results of the RNG model, the CRZ and SJ regions are folded, corrugated, and have completely asymmetrical behavior due to Kelvin-Helmholtz instability. It may cause the turbulence models without swirl corrections to be unable to simulate the important swirl flow characteristics correctly, while the RNG model has considered the swirl influence in the turbulence viscosity correction. Therefore, a suitable swirl flow correction considering the swirl number is important in turbulence models for such simulations.

Keywords: Turbulent model, RNG, swirl flow

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