

# ***ASEM19 ANBRE19***

*The 2019 World Congress on Advances in  
Structural Engineering and Mechanics (ASEM19)*

*The 2019 World Congress on Advances in  
Nano, Bio, Robotics, and Energy (ANBRE19)*

ICC JEJU, Jeju island, Korea, 17 - 21 September, 2019



*Organized by:* Int'l Association of Structural Eng. & Mechanics (IASEM)  
Korea Advanced Inst. of Science & Technology (KAIST)  
Korea Association of Computational Mechanics (KACM)

*In Cooperation with:* Techno-Press Journals

*Sponsored by:* Korea Federation of Science and Technology Societies  
Korea National Tourism Corporation  
Jeju Convention & Visitors Bureau

<http://asem19.org>  
<http://anbre19.org>



Techno-Press



Jeju CVB  
Jeju Convention & Visitors Bureau  
[사] 제주컨벤션뷰로

## CHAIRMAN'S WELCOME



It is with a great pleasure and honor for me to welcome you all here for ASEM19/ ANBRE19 Congress in Jeju, Korea. As the Joint Congress will combine multiple international conferences into a single event, it will create an excellent opportunity for the participants to be provided with a greater variety of topics and exchange views on the issues of the future developments in the allied fields.

The ASEM World Congress was first organized in cooperation with Techno-Press journals in 2011. As the number of Techno-Press journals has been increased to cover the critically important areas, namely nano, bio, robotics and energy, ANBRE was organized in 2013 focusing on structural materials and their applications.

Thus the Congress will be the premier international forum that brings together academics and practicing engineers to exchange the frontier research results and emerging technologies in the broad topics. I hope the Congress will provide a unique opportunity for participants not only to exchange the recent developments in the important technical areas, but also to meet the old friends and make new ones.

I would like to extend my appreciation to all the participating authors for their valuable time and efforts to make contribution to this joint congress. Thanks are also due to the keynote lecturers for their important contribution to this congress, and the invited mini symposium organizers for their hard work, not forgetting the session chairs who will take on very important roles.

Jeju's volcanic island and lava tubes have been inscribed on the UNESCO World Natural Heritage List. Being located at the center of Northeast Asia, with unique geographical features, such as mild subtropical climate, beautiful nature in harmony with mountains and sea, Jeju has been listed as a "New Natural Wonder of the World" in a world-wide poll. Jeju has become a world-famous resort island of tourism, as well as perfect convention venue where we hold our congress.

Some financial supports were provided by the funding agencies which include Korean Federation of Science and Technology Societies, Korea National Tourism Corporation and Jeju Convention & Visitors Bureau. Their generous supports are gratefully acknowledged.

Finally, I would like to extend my appreciation to my colleagues, namely the congress secretaries, members of the organizing committee, chairmen of participating international conferences for their contribution which made this congress a very successful one. And I wish all the participants a happy and memorable stay in Jeju Island.

Thank you.

Jeju, Korea  
September 2019

Chang-Koon Choi  
Chairman, ASEM19/ANBRE19

# CONGRESS ORGANIZATION (ASEM19/ANBRE19)

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## CONGRESS ORGANIZATION

### Congress Chair

Chang-Koon Choi (KAIST)

### Secretary General:

Hyo-Gyoung Kwak (KAIST)

### International Advisory Committee

Ashraf El Damatty (Univ. of Western Ontario)	Adnan Ibrahimbegovic (Univ. Technologie Compiegne/ Sorbonne Univ.)
Dennis Lam (Univ. of Bradford)	Brian Uy (Univ. of NSW)
Stephen Foster (Univ. of NSW)	Andrzej Winnicki (Cracow Univ. of Tech.)
C.S. David Chen (Nat'l Taiwan Univ.)	Alam Md. Mahbub (Harbin Inst. of Tech)
B.F. Spencer, Jr. (Univ. of Illinois)	Enrico Drioli (Univ. of Calabria)
Keh-Chyuan Tsai (Nat'l Taiwan Univ.)	Seong Hoon Yoon (Nalco Water)
Moo-Hyun Kim (Texas A&M Univ.)	Satishi Nagarajaiah (Rice Univ.)
Erasmus Carrera (Politecnico di Torino)	Francisco M. Linares (Univ. of Turabo)

### Local Organizing Committee

**Chair:** Chang-Koon Choi (KAIST)

**Co-chair:** Phill-Seung Lee (KAIST)

### Members

Chung-Bang Yun (KAIST)	Chang-Sik Ha (Pusan Nat'l Univ.)
Hyung-Jo Jung (KAIST)	Sungpyo Kim (Korea Univ.)
H.K. Lee (KAIST)	Jin-Keun Kim (KAIST)
Jong-Ho Shin (Konkuk Univ.)	Jeong-Tae Kim (Pukyong Nat'l Univ.)
Jeong-Yong Lee (KAIST)	Thomas Kang (Seoul Nat'l Univ.)
Hyun Myung (KAIST)	Gunjin Yun (Seoul Nat'l Univ.)
Jun-Ho Oh (KAIST)	Yong-San Yoon (KAIST)
Young-Deok Kim (Catholic Kwandong Univ.)	Hankyu Yoo (Sungkyunkwan Univ.)
Gye-Chun Cho (KAIST)	
Icktae Yeom (Sungkyunkwan Univ.)	
Jihyang Kweon (Konkuk Univ.)	

## CONGRESS INFORMATION

**Official Language:** English

### Secretariat:

**Until September 17, 2019**

Secretariat, ASEM19/ANBRE19

P.O. Box 33, Yuseong, Daejeon 34186, Korea

Tel: (+82-42)828-7995, Fax: (+82-42)828-7997

E-mail: [info@asem19.com](mailto:info@asem19.com) / [info@anbre19.com](mailto:info@anbre19.com)

**After 17:00, September 17, 2019**

Secretariat, ASEM19/ANBRE19

3<sup>rd</sup> Floor, Business Center

Int'l Convention Center Jeju, Jeju, South Korea

Tel: (+82-64)738-5170

### Speakers' Preparation Room:

ICC 3<sup>rd</sup> Floor, Rm 300

Hours: Sep.18-19 08:30-17:00, Sep.20 08:30-12:00

## PARTICIPATING INT'L CONFERENCES

### The 2019 International Conference on

**Innovative Structural Engineering & Mechanics (ISEM19)**

(Co-chairs: Chang-Koon Choi, Phill-Seung Lee)

**Steel & Composite Structures (ICSCS19)**

(Co-chairs: Brian Uy, Dennis Lam)

**Computational Technologies in Concrete Structures (ICTCS19)**

(Co-chairs: Hyo-Gyoung Kwak, Andrezej Winnicki)

**Smart Structures and Systems (ICSSS19)**

(Co-chairs: Chung-Bang Yun, B.F. Spencer, Jr.)

**Earthquakes and Structures (ICEAS19)**

(Chairman: H.K. Lee)

**Tunnels and Underground Spaces (ICTUS19)**

(Co-chairs: HanKyu Yoo, Byeongdoo Son)

**Wakes and Flow-Induced Vibrations (ICWFIV19)**

(Chairman: Alam Md Mahbub)

**Advances in Nano Research (ICANR19)**

(Chairman: Jeong-Yong Lee)

**Advances in Biomaterials and Biomechanics in Bioengineering (ICBME19)**

(Chairman: Chang-Koon Choi)

**Advances in Robotics Research (ICARR19)**

(Chairman: Hyun Myung)

**Advances in Energy Research (ICER19)**

(Chairman: Francisco M. Linares)

**Composite Materials and Engineering (ICCME19)**

(Chairman: Chang-Koon Choi)

# GENERAL INFORMATION

## REGISTRATION

The registration fee for the congress is US\$700 if registered on or before June 30, 2019 and US\$750 thereafter until the last day of pre-registration (July 31, 2019). The registration fee should be paid on or before July 31, 2019. For on-site registration (US\$800), pre-arrangement should be made.

Participants' spouses and children are eligible to register as accompanying persons.

### Registration as a regular participant covers:

The fee will cover a copy of congress proceedings, admission to technical sessions, coffee services during session breaks, lunches, welcome reception, and congress banquet.

### Registration as an accompanying person covers:

Admission to technical sessions, congress reception, coffee breaks during the congress and banquet.

### Registration Fees

Regular Participant : US\$700 (on or before June 30)  
: US\$750 (on or before July 31)  
: US\$800 (onsite)

Accompanying Person : US\$180

\*For Additional banquet, reception and lunch tickets, inquire to: ASEM19/ANBRE19 staff at the Secretariat. (3<sup>rd</sup> Floor Lobby)

### On-Site Registration: Place and Hours

Tue Sep.17: 3<sup>rd</sup> Fl. Lobby 17:00-19:30  
Wed, Thu, Fri Sep.18-20: 3<sup>rd</sup> Fl. Lobby 08:30-17:00

## PAYMENT & REMITTANCE

*Payment for registration fee should be in the form of:*

### • Bank Draft

Please make payable to Secretariat ASEM19/ANBRE19. Please have your name appear on your bank draft, and no personal checks will be accepted.

### • Bank Transfer

- Bank Account NO.: 1081-400-427598  
- Account Holder: Gukje Gujo Assoc.  
- SWIFT No.: HVBKCRSE  
- Bank Address:  
Woori Bank, Daejeon KAIST Branch. 373-1 Guseong-dong, Yuseong-gu, Daejeon, South Korea  
\* The banker's fee for remittance must be born by the sender.

### • Credit Card

VISA or Master Card is acceptable.

### Confirmation & Receipt

Upon paying your registration fees and receiving confirmation, please retain the confirmation letter and/or receipt to avoid any contingencies and present them at the registration desk if so requested.

### Cancellation & Refund

If the cancellation in writing is received by July 31, 2019 or the submitted paper is not accepted for presentation, the paid registration fee is fully refunded and after that date, a processing fee of US\$100 will be deducted. No refunds will be given after August 1, 2019. For the fully registered participants who are not able to attend the conference, a set of proceedings will be sent by mail.

## PUBLICATIONS

### Congress Proceedings

The full texts of papers (4~20 pages) will be published in the *IASEM Online Proceedings* and given to the participants in the form of an usb flash drive.

ASEM19: [http://www.i-asem.org/asem19\\_publication.html](http://www.i-asem.org/asem19_publication.html)

ANBRE19: [http://www.i-asem.org/anbre19\\_publication.html](http://www.i-asem.org/anbre19_publication.html)

Only the papers of pre-registered authors will be included in the congress proceedings. Proceedings are distributed to the registered participants at the congress.

### Journal Version Papers

As the congress is held in association with the Techno-Press Journals, authors are encouraged to submit their Journal version papers (normally 12-24 journal pages, single column) to the relevant Techno-Press journals before or after the congress. The journal version papers should be prepared in accordance with the "Instruction to Prepare Manuscript of Techno-Press Journals".

(<http://www.techno-press.org/papers/instruction.php>)

Submitted papers will undergo the peer review process and accepted papers will appear in the journal of author's choice.

### **Techno-Press Journals ([www.techno-press.com](http://www.techno-press.com))**

- Structural Engineering & Mechanics (SEM)
- Wind & Structures (WAS)
- Steel & Composite Structures (SCS)
- Computers & Concrete (CAC)
- Smart Structures & Systems (SSS)
- Geomechanics & Engineering (GAE)
- Membrane Water Treatment (MWT)
- Earthquakes & Structures (EAS)
- Ocean Systems Engineering (OSE)
- Advances in Materials Research (AMR)
- Advances in Environmental Research (AER)
- Coupled Systems Mechanics (CSM)
- Advances in Automotive Engineering (AAE)
- Advances in Computational Design (ACD)
- Advances in Concrete Construction (ACC)
- Advances in Energy Research (ERI)
- Advances in Nano Research (ANR)
- Advances in Robotics Research (ARR)
- Advances in Aircraft & Spacecraft Science (AAS)
- Biomaterials & Biomechanics in Bioeng. (BME)
- Structural Monitoring & Maintenance (SMM)
- Composite Materials and Engineering (CME)

# GENERAL INFORMATION

## VENUE AND ACCOMMODATION

### Jeju Island

Jeju's volcanic island and lava tubes have been inscribed on the UNESCO World Natural Heritage List. Being located at the center of Northeast Asia, with unique geographical features, such as mild subtropical climate, with small temperature variation, good weather, beautiful nature in harmony with mountains and sea, and many tourist attractions, Jeju has been listed as a "New Natural Wonder of the World" in a world-wide poll. Jeju has become a world-famous resort island of tourism, recreation as well as meetings and conventions. Also, well established tourist infrastructures, including reasonably priced accommodations, airport, transportation, and IT networks made a Jeju the perfect convention venue. Jeju is connected with many domestic and international airlines through Jeju International Airport, which is accessible in about an hour from any point on the island.

### ICC Jeju

ASEM19/ANBRE19 Congress will be held at the International Convention Center Jeju (ICC Jeju) located on the southern coast of Jeju Island where you can enjoy the beautiful ocean view and spectacular mountain view. The excellent conference facilities including function rooms, restaurants, fitness center, tennis courts, jogging track will make the stay in Jeju a most memorable one.

### Accommodation

#### ■ Booyoung Jeju Hotel & Resorts

Tel: +82-64-731-5500 / Fax: +82-64-731-5555

Website: <http://www.booyoungjejuhotel.com/>

### Rates

Hotel	Room Type & Rates	Remarks
Booyoung Hotel	<ul style="list-style-type: none"> <li>- KRW 120,000 (Deluxe Double/Twin)</li> <li>- KRW 80,000 (Standard Double/Twin)</li> <li>add. Tax + service charge (Inclusive)</li> <li>- One breakfast: KRW 25,000</li> </ul>	2 minute walk from ICC
Booyoung Resort	<ul style="list-style-type: none"> <li>- KRW 210,000 (Premium Suite)</li> <li>- KRW 140,000 (Premium)</li> <li>incl. Tax + service charge (Inclusive)</li> <li>- One breakfast: KRW 25,000</li> </ul>	2 minute walk from ICC

\* The room rates are special conference rates.

\* Exchange rate; US\$ = ₩1,100 (check for current rates)

\* Note : +30,000 KRW for Weekends  
+20,000 KRW for Ocean View

## LOCAL TRANSPORTATION

### To Seoul (Incheon International Airport (ICN)):

Those who are traveling a long distance from America or Europe may come via Incheon International Airport (ICN)-Seoul, which is one of the largest Airport hub in the world.

### To direct flights to Jeju Island:

Jeju is directly accessible from many major cities in Northeast Asia, such as Beijing, Shanghai, Taipei, Hong Kong, Tokyo, Osaka, etc.

### Seoul ↔ Jeju:

There are no flights from Incheon Int'l Airport to Jeju Int'l Airport except in the early morning and late evening. Participants are advised to come to Gimpo Domestic Airport (GMP, Seoul) to fly to Jeju.

### Airport Transfer:

#### Incheon International Airport (ICN) to Gimpo Domestic Airport (GMP):

The easiest way to come from Incheon International Airport to Gimpo Airport is taking buses (frequent and USD 5-10) or train (every 30 min and cost USD 3). When you walk out of the airport building, you can find ticket office. There are several different kinds of buses. The journey will take about 35 min.

### Gimpo Airport to Jeju:

There are over 60 Flights daily from Gimpo Domestic Airport to Jeju Airport. The flying time from Seoul to Jeju will be about an hour.

### To Booyoung Jeju Hotel & Resorts

**By taxi:** it will take about 50 min from the airport to the hotel at a cost of about ₩35,000.

**By Airport limousine:** Taking Airport Limousine buses (#600) is frequent and more economical way. The bus leaves Jeju International Airport every 20 minutes and the journey takes about 1 hour 15 minutes. The fair is ₩4500. The bus serves from 6:20 am to 10:00 pm. After walking out of the Gate 5, you can take the bus numbered '600'.



**City bus:** the fee is 1,200 won and there will be additional charges for long distance travels (zone 2, 3). (You may travel mostly within zone 1)

### Taxi



## GENERAL INFORMATION

Taxi is another convenient way of traveling in Jeju. The basic fare is 2,800 won for the first 2 km and 100 won for each additional 144 m. (Mostly interpretation service available)

### Rent a Car

If you want to rent a car, you must have International Driver's License (Permit). You may rent a car at the inside airport building or Rent Car Desk of each hotel.

### Field Trip

#### Pre-Conference Tour

**Date:** 17 September (TUE) 17:30

**Course:** ICC – Jusangjeolli Cliffs – ICC

**Price:** Free of charge (Walking Tour)



**Jusangjeolli Cliffs** (columnar jointing) is a spectacular volcanic rock formation at the southern coast of Jeju Island, near the International Convention Center Jeju. The hexagon-shaped columnar joints gather like a giant folding screen, showing the unique beauty of Jeju. These columnar joints are made during the shrinking process of volcanic activities, as basaltic lava flow cools quickly in the water. Each columnar joint is 30-40 meters tall and they extend for about 1 kilometer.

#### Afternoon Tour

**Date:** 20 September (FRI) 13:30 – 17:00

**Course:** ICC – Olle Route #10 (Mt. Songaksan & Yongmeori Beach) – O'Sulloc Tea Museum – ICC

**Price:** USD 10/person (Tour admission included)



**Jeju Olle Trail** is the connection of long routes developed for walking travelers along the coastlines of Jeju Island. Olle [ole] means a narrow pathway that is connected from the street to the house's gate in Jeju dialect. It offers a

unique opportunity to soak in the unique natural landscape of Jeju that allows walkers to enjoy farmland and forests, grasses and palm trees, fresh water ponds and ocean vistas, waterfalls and cliffs, often all on a single journey ([www.jejuolle.org](http://www.jejuolle.org)). **O'Sulloc Tea Museum** is situated nearby oreum small volcanic cones scattered throughout the island. Jeju Island has perfect climate for farming best quality tea. It will help you to understand traditional Korean tea culture while enjoying a variety of green tea.

#### Full Day Tour

**Date:** 21 September (SAT) 09:00 – 18:00

**COURSE:** ICC – Olle Route #7 (Oedolgae) – Jeju Folk Village – Seopjikoji Beach – Seongsan Ilchulbong – ICC

**Price:** USD 50/person (Tour admission & Lunch included)



**Jeju Folk Village** was created to preserve the cultural heritage of Jeju in their natural and original states. It was formed through historical research, and is made up of cultural assets of Jeju mainly from 19<sup>th</sup> century, such as the mountain villages, fishing villages, shamanism villages, Jeju Yeongmun (former Jeju Government Office), and Yubaeso (Forced Exile House). ([www.jejufolk.com](http://www.jejufolk.com))

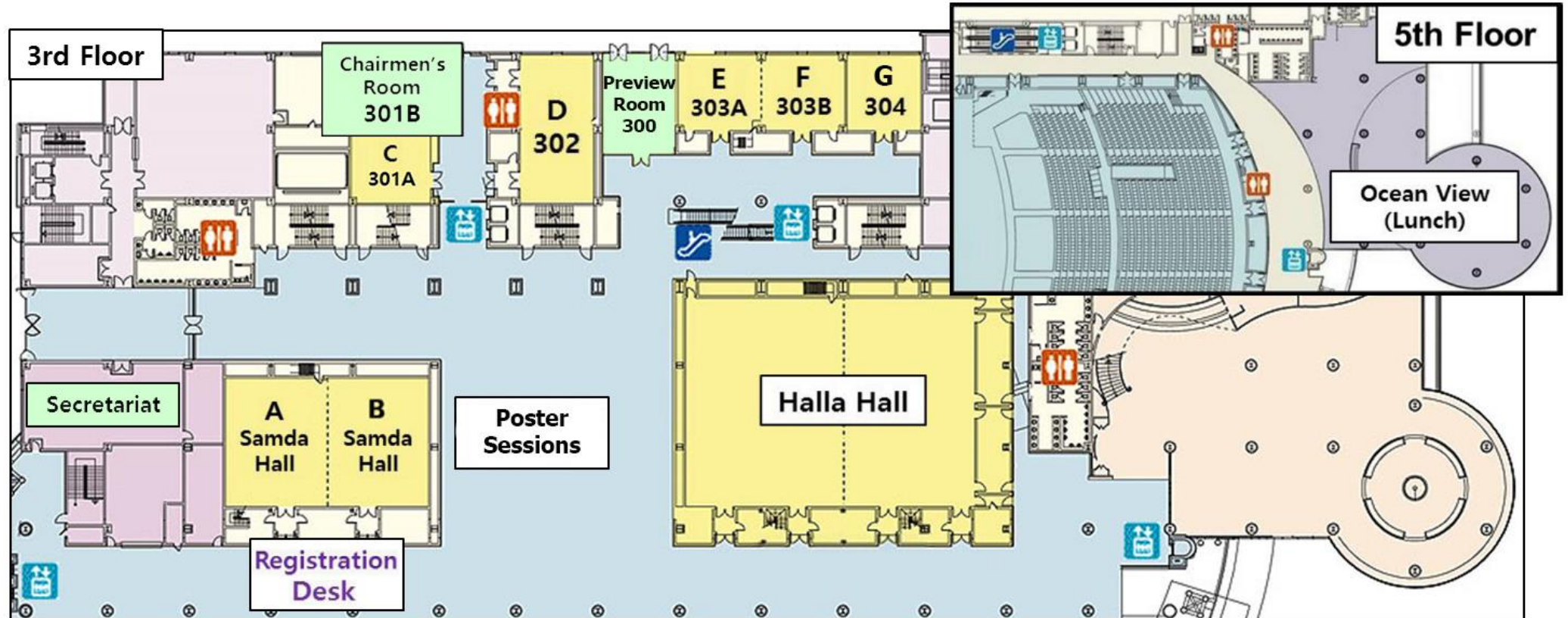
**Seopjikoji** is located at the end of the eastern shore of Jeju-do Island. "Seopji" is the old name for the area, and "Koji" is Jeju dialect meaning a sudden bump on land. On Koji hill which is wide and flat, there stands a stone Bongsudae called "Hyeopjayeondae" with a 4m height and 9m length and width that has retained its original form. Seopjikoji was the filming site of several Korean TV dramas like "All-in." **Seongsan Ilchulbong (sunrise peak)** rose from under the sea in a volcanic eruption over 100,000 years ago. Located on the eastern end of Jeju Island, there is a huge crater at the top. The crater is about 600m in diameter and 90m high. With the 99 sharp rocks surrounding the crater, it looks like a gigantic crown. You may also enjoy the performance by "Haenyeos," referring to female divers who dive into the ocean water to gather various shellfish, seaweeds, etc, without using any underwater diving equipment.

*\*The itineraries are subject to change due to weather & traffic condition.*

*\*\*Comfortable clothes & walking shoes are highly recommended.*

# FLOOR PLANS

## ASEM19/ANBRE19 Venue



# Approaches to ASEM19/ANBRE19 Venue



## No. 1 Course (By airport limousine):

Jeju Airport (Road No. 1134, Pyeonghwa-ro)

Point of departure : Airport - Shin-Jeju - Jeju Racecourse - Pyeonghwa-ro - Jungmun Sightseeing Complex - ICC JEJU

\* By car: 50 minutes, by airport limousine: 60 minutes



## No. 2 Course (By car):

(Road Nos. 1139 and 1100)

Point of departure : Airport - Shin-Jeju - Halla Arboretum - Road of Mystery - Eorimok - Tamra University - ICC JEJU

\* By car: 45 minutes



# ASEM19/ANBRE19 Program At a Glance

SEP 17 TUE	SEPTEMBER 18 WEDNESDAY	SEPTEMBER 19 THURSDAY	SEPTEMBER 20 FRIDAY
<b>17:00</b> ~ <b>19:30</b>  Registration	<b>08:00 - 17:00 Registration</b>	<b>08:30 - 17:00 Registration</b>	<b>08:30 - 10:00 Registration</b>
	<b>09:00 - 09:10 Opening Ceremony</b> <b>W1O:</b> Opening Remarks (Chang-Koon Choi)  <b>09:10 – 09:50 Plenary Keynote Lecture</b> <b>W2P:</b> Steel and Composite Structures: Key challenges and trends for the future (Brian Uy, Australia)	<b>09:00 - 09:35 Keynote Lectures IV</b> <b>H1A:</b> Cement-based adsorbent and bio-concrete: Experiments and simulations (H.K. Lee, Korea)  <b>09:35 - 10:10 Keynote Lectures V</b> <b>H2A:</b> Digitalization in TBM-Tunnelling-automatization of rock mass classification and update of geological prognosis (Thomas Marcher, Austria) <b>H2B:</b> Sustainable Urban Robotics Technologies for Smart Cities (Hyun Myung, Korea)	<b>09:00 - 10:15 Concurrent Sessions</b> <b>F2A:</b> Computational Mechanics and Numerical Modeling <b>F2B:</b> Connections and Design Codes <b>F2C:</b> Concrete & RC Structures <b>F2D:</b> Smart Structural Systems <b>F2E:</b> Fluid-Structure Interactions I (Alam MD Mahbub)
	<b>09:50 - 10:10 Coffee Break</b>	<b>10:10 - 10:30 Coffee Break</b>	<b>10:15 - 10:30 Coffee Break</b>
	<b>10:10 - 10:45 Keynote Lectures I</b> <b>W3A:</b> Topology Optimization of Structures subject to Stochastic Dynamic Loads (B.F. Spencer, Jr., USA) <b>W3B:</b> Development of composite floor system for circular economy (Dennis Lam, UK)  <b>10:50 - 11:25 Keynote Lectures II</b> <b>W3C:</b> Numerical Modelling for Climate Change Impacts on RC Structures (Stephen Foster, Australia) <b>W3D:</b> Underground construction on the Moon (Jamal Rostami, USA)  <b>11:30 - 12:05 Keynote Lectures III</b> <b>W3E:</b> Introduction to the strain-smoothed element method for analysis of solid and shell problems (Phill-Seung Lee, Korea) <b>W3F:</b> Advanced numerical simulations in concrete mechanics (Andrzej Winnicki, Poland)	<b>10:30 - 12:00 Concurrent Sessions</b> <b>H3A:</b> Elastic/acoustic Metamaterials: Novel Designs and Applications (Rui Zhu, Guoliang Huang, Gengkai Hu and Yuesheng Wang) <b>H3B:</b> Bridge Engineering and Design Code <b>H3C:</b> Linear & Nonlinear Seismic Analysis Methods <b>H3D:</b> Improvements in Conventional Tunneling & Tunneling and Underground Works in Extreme Conditions <b>H3E:</b> Artificial Intelligence-based Structural Health Monitoring (Seunghee Park and Sung-Han Sim) <b>H3F:</b> Computational Mechanics and Numerical Modeling	<b>10:30 - 12:00 Concurrent Sessions</b> <b>F3A:</b> Structural Dynamics and Control <b>F3B:</b> Understanding nano/bio Interfacial reactions in water and wastewater treatment (Sungjun Bae) <b>F3C:</b> Material Properties and Dynamic Behavior of Civil Engineering Structures and Systems (H.K. Lee) <b>F3D:</b> Autonomous Bridge Inspection using Unmanned Aerial Vehicles and Deep Learning (Hyung-Jo Jung, Soojin Cho and Yun-Kyu An) <b>F3E:</b> Fluid-Structure Interactions II (Alam MD Mahbub)
	<b>12:05 - 13:00 Lunch</b>	<b>12:00 - 13:00 Lunch</b>	

# ASEM19/ANBRE19 Program At a Glance

SEP 17 TUE	SEPTEMBER 18 WEDNESDAY	SEPTEMBER 19 THURSDAY	SEPTEMBER 20 FRIDAY
<b>17:00</b> ~ <b>19:30</b>  <b>Registration</b>	<b>13:00 - 14:30 Concurrent Sessions</b> <b>W4A:</b> Structural Engineering <b>W4B:</b> Composite Members and Structures <b>W4C:</b> Fiber Reinforcement <b>W4D:</b> Structural and Hydraulic Interaction in Underground Structures <b>W4E:</b> Structural Health Monitoring	<b>13:00 - 14:30 Concurrent Sessions</b> <b>H4A:</b> The 2nd Joint NU-SNU-BOKU Seminar on the Design and Analysis of Innovative Structural and Geotechnical Systems I (Deuckhang Lee, Thomas Kang and Alfred Strauss) <b>H4B:</b> Composite Materials & Structures I <b>H4C:</b> Bluff-Body aerodynamics <b>H4D:</b> Resilience and Sustainability in Underground Space <b>H4E:</b> Maintenance and Safety of Existing Infrastructures: Civil Engineering Applications (Seung-Seop Jin and Hyung-Jo Jung) <b>H4F:</b> Food and nutrition, pharmaceuticals and drugs, environment, energy and water fulfilling the basic necessities of human individuals I (Thomas Stahl)	
	<b>14:30 - 14:50 Coffee Break</b>	<b>14:30 - 14:50 Coffee Break</b>	
	<b>14:50 - 17:20 Concurrent Sessions</b> <b>W5A:</b> Autonomous Bridge Inspection using Unmanned Aerial Vehicles <b>W5B:</b> Behaviour and design of high-performance structural steel in steel and composite structures (Dongxu Li and Jia Wang) <b>W5C:</b> Performance Evaluation of Concrete Structures subjected to Blast Loading (Hyo-Gyoung Kwak and Sung-Wook Kim) <b>W5D:</b> Developments in Underground Space Technologies <b>W5E:</b> Smart Sensing and Processing for SHM (Sung-Han Sim)	<b>14:50 - 17:20 Concurrent Sessions</b> <b>H5A:</b> The 2nd Joint NU-SNU-BOKU Seminar on the Design and Analysis of Innovative Structural and Geotechnical Systems II (Deuckhang Lee, Thomas Kang and Alfred Strauss) <b>H5B:</b> Composite Materials & Structures II <b>H5C:</b> <b>H5D:</b> Innovation in Mechanized Tunneling <b>H5E:</b> Site Characterization <b>H5F:</b> Food and nutrition, pharmaceuticals and drugs, environment, energy and water fulfilling the basic necessities of human individuals II (Thomas Stahl)	
	<b>18:00 - 19:30 Reception</b> <b>OCEAN VIEW in ICC JEJU 5<sup>th</sup> Fl.</b>	<b>18:00 - 20:00 Banquet</b> <b>Booyoung Jeju Hotel &amp; Resorts (Sapphire B2F)</b>	

# TECHNICAL PROGRAM

**TUESDAY SEPTEMBER 17, 2019**

**REGISTRATION**  
**17:00 – 19:30**  
**ICC JEJU 3<sup>rd</sup> Fl.**  
**Conference Hall Lobby**

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**WEDNESDAY SEPTEMBER 18, 2019**

**REGISTRATION**  
**8:00 – 17:00**  
**ICC JEJU 3<sup>rd</sup> Fl.**  
**Conference Hall Lobby**

**OPENING CEREMONY**  
**(W1O, 09:00 – 09:10)**

**Opening Remarks** *Halla Hall*  
 Chang-Koon Choi, Chairman, ASEM19/ANBRE19

**PLENARY KEYNOTE LECTURE**  
**(W2P, 09:10 – 09:50)**

**SESSION W2P** 09:10-09:50 *Halla Hall*  
 Chairman: Dennis Lam

**Steel and Composite Structures: Key challenges and trends for the future;** Brian Uy (Australia)

**COFFEE BREAK**  
**09:50 – 10:10**  
**Lobby**

**KEYNOTE LECTURES I**  
**(W3A – W3B, 10:10 – 10:45)**

**SESSION W3A** 10:10-10:45 *Room A (Samda Hall)*  
 Chairman: Chung-Bang Yun

**Topology Optimization of Structures subject to Stochastic Dynamic Loads;** B.F. Spencer, Jr. (USA)

**SESSION W3B** 10:10-10:45 *Room B (Samda Hall)*  
 Chairman: Brian Uy

**Development of composite floor system for circular economy;** Dennis Lam (UK)

**KEYNOTE LECTURES II**  
**(W3C – W3D, 10:50 – 11:25)**

**SESSION W3C** 10:50-11:25 *Room A (Samda Hall)*  
 Chairman: Phill-Seung Lee

**Numerical Modelling for Climate Change Impacts on RC Structures;** Stephen Foster (Australia)

**SESSION W3D** 10:50-11:25 *Room B (Samda Hall)*  
 Chairman: Yong Joo Lee

**Underground construction on the Moon;** Jamal Rostami (USA)

**KEYNOTE LECTURES III**  
**(W3E – W3F, 11:30 – 12:05)**

**SESSION W3E** 11:30-12:05 *Room A (Samda Hall)*  
 Chairman: B.F. Spencer Jr.

**Introduction to the strain-smoothed element method for analysis of solid and shell problems;** Phill-Seung Lee (Korea)

**SESSION W3F** 11:30-12:05 *Room B (Samda Hall)*  
 Chairman: Hyo-Gyoung Kwak

**Advanced numerical simulations in concrete mechanics;** Andrzej Winnicki (Poland)

**WEDNESDAY LUNCH**  
**12:05 – 13:00**  
**OCEAN VIEW in ICC JEJU 5<sup>th</sup> Fl.**

# TECHNICAL PROGRAM

## CONCURRENT SESSIONS

(W4A – W4E, 13:00 – 14:30)

### SESSION W4A 13:00-14:30 Room A (Samda Hall) Structural Engineering

Chairmen: Ho Fai Wong and Zafer Sakka

**Machine learning-based method for prediction of impact load damage;** Quoc Hoan Doan (Korea)\*, Duc Kien Thai

**Effects of beam-column depth ratio on seismic behavior of non-seismic detailed reinforced concrete beam-column joints;** Ying Liu, Ho-Fai Wong (Hong Kong)\*, Sung-Hei Luk, Ching-Kit Tong, Hei Lam

**Effects of eccentricity on seismic behavior of non-seismically designed reinforced concrete beam-column joint;** Ho-Fai Wong (Hong Kong)\*, Ying Liu, Sung-Hei Luk, Pok-Man Lee, Wing-Hei Kwong

**Verification of out-of-plane performance of masonry veneer anchor;** JongHoon Kwon (Korea)\*, Hong-Gun Park

**Structural Ductility of Edge-supported Two-Way Slabs Reinforced with Low-Ductility Steel;** Zafer Sakka (Kuwait)\*, R. Ian Gilbert

**Nonlinear motion analysis by the vector form intrinsic thin shell elements;** Chung-Yue Wang (Taiwan)\*, Shih-Hong Chen, Jia-Jung Lin, Shih-Ming Chou

### SESSION W4B 13:00-14:30 Room B (Samda Hall) Composite Members and Structures

Chairman: Jie Yang

**Experimental studies on the behavior of headed shear studs for composite beams in fire;** Ohk Kun Lim (Korea)\*, Sengkwan Choi, Sungwook Kang, Minjae Kwon, J. Yoon Choi

**Push tests on demountable shear connectors in profiled composite slabs;** Jie Yang (United Kingdom)\*, Dennis Lam, Xianghe Dai, Therese Sheehan, Kan Zhou, Yong C. Wang, Razvan M. Sencu

**System-based reliability analysis for CFST chord to CHS brace truss bridges;** Silin Chen (Australia)\*, Chao Hou, Hao Zhang

**Finite element analysis on ice-shedding of GFRP-steel composite transmission tower-line coupling system;** Jiantao Wang (China)\*, Qing Sun

**Effect Of Plastic Fiber On Behavior Of Composite Steel Plate-Concrete Slabs;** Khalil Ibraheem Aziz (Iraq)\*, Sheelan M. Hama, Huda Mokbel Kuhair

**Effect of repeated cyclic using of blast abrasive material on the steel surface characteristics;** Aran Kim (Japan)\*, Shigenobu Kainuma, Tatsuya Ikeda, Takeshi Kotera

### SESSION W4C 13:00-14:30 Room C (#301A) Fiber Reinforcement

Chairman: Toshiyuki Kanakubo

**Uniaxial compressive performance of RC columns with induced corrosion cracks;** Togo Aburano (Japan)\*, Amadou Sakhir Syll, Toshiyuki Kanakubo

**Shear behavior of DFRCC coupling beams using PVA and steel fiber;** Toshiyuki Kanakubo (Japan)\*, Yuriko Ozu, Keisuke Namiki

**Evaluation of crack width in steel reinforced DFRCC members;** Daiki Sunaga (Japan)\*, Keisuke Namiki, Toshiyuki Kanakubo

**Improvement of shear stud spacing in steel-concrete-steel**

**sandwich composite structures;** WonHo Lee (Korea)\*, Hyo-Gyoung Kwak

**Study on pullout behavior of single steel fiber in SFRCC;** Saki Echizen (Japan)\*, Toshiyuki Kanakubo

**Shear Strength of Ultra-High Performance Hybrid Fiber Reinforced Concrete Members;** Chung-Chan Hung (Taiwan)\*, Manuel Bermudez

### SESSION W4D 13:00-14:30 Room D (#302) Structural and Hydraulic Interaction in Underground Structures

Chairmen: Jamal Rostami and Bumjoo Kim

**Inversion analysis of three-dimensional initial geostress field of underground caverns of hydropower station;** Shun-Shun Li (China)\*, Chao Su

**The study on performance evaluation of heat resistance and smoke control system using air-curtain system in tunnel;** Byoung-Jik Park (Korea)\*, Yang-Kyun Kim, Yong-Ho Yoo, Jin-Ouk Park, Hwi-Seong Kim

**Significance of Anisotropic Permeability in the Coupled-numerical Analysis of Tunnelling;** Kang-Hyun Kim (Korea)\*, Ho-Jong Kim, Jae-Ho Jeong, Jong-Ho Shin

**Rock-support interaction analysis for tunnels in generalized strain-softening Mohr-coulomb rock masses considering the dead weight loading;** Mohammad Reza Zareifard (Iran)\*

**Earthquake Risk Assessment of Cut-and-Cover Underground Railway Station;** Sun-Yong Kwon (Korea)\*, Mintaek Yoo, Chengcan Wang, Seongwon Hong

### SESSION W4E 13:00-14:30 Room E (#303A) Structural Health Monitoring

Chairmen: Jin-Hak Yi and Jing Zhang

**Guided Waves Methods for Local Damage Assessments in Steel Structural Members;** Jia-Qi Tu (China)\*, Chung-Bang Yun, Xian Xu, Zhi-Feng Tang, Jian-Jun Wu

**Structural Model Updating of Gagecho Ocean Research Station Using Mass Reallocation Method;** Jin-Hak Yi (Korea)\*, Byungmo Kim

**Structural vibration monitoring of a tall building in Kuwait;** Jafarali Parol (Kuwait)\*, Jamal Al-Qazweeni, Hasan Kamal, Abdullah Al-Enezi, Farah Al-Jeri

**Extraction of bridge information based on the double-pass double-vehicle technique;** Ying Zhan, Francis T.K. Au, Dong Yang (China)\*

**Output-only modal parameters identification for time-varying structures based on multisensory S-transform;** Dong Yang, Jing Zhang (China)\*

**Performance evaluation of viscous damping devices in buildings based on earthquake record;** Ging-Long Lin, Jer-Fu Wang, Chi-Chang Lin (Taiwan)\*, Jim Lin

## COFFEE BREAK

14:30 – 14:50

Lobby



# TECHNICAL PROGRAM

## CONCURRENT SESSIONS

(W5A – W5E, 14:50 – 17:20)

### SESSION W5A 14:50-17:20 Room A (Samda Hall)

#### Autonomous Bridge Inspection using Unmanned Aerial Vehicles

Chairman: Eric T. Matson

**Control for cooperative robot systems in tasks of manipulation in interaction with the environment;** Carlos Cruz, Alejandro Rodríguez, Luis Evangelista (Mexico)\*

**Accuracy improvement of Pulsed LiDAR using an Adaptive Radius Outlier Removal Algorithm;** Yeomin Yoon (Korea)\*, Youngjun Cho, Junhyun Park, Joowan Lyu, Kyihwan Park

**An Objectness Score for Accurate and Fast Detection during Navigation;** Hongsun Choi (Korea)\*, Mincheul Kang, Youngsun Kwon, Sung-eui Yoon

**Risk-aware path planning based on digital map class classification for unmanned aerial vehicles;** Jun-ho Choi (Korea)\*, Sung-wook Jung, Won-ho Song, Hyun Myung

**Velocity Detection to Assess the UAV Threat Mitigation Warning Time;** Kar Ee Ho (United States)\*, Youlim Ko, Yaqin Wang, Eric T. Matson

### SESSION W5B 14:50-17:20 Room B (Samda Hall)

#### Behaviour and design of high-performance structural steel in steel and composite structures (Dongxu Li and Jia Wang)

Chairmen: Dongxu Li and Jia Wang

**Development and Testing of Cored Moment Resisting Stub Column Dampers;** Po-Chien Hsiao, Kun-Sian Lin (Taiwan)\*, Wei-Chieh Liao

**Effect of concrete infill on local buckling of circular columns: a detailed investigation;** Sina Kazemzadeh Azad (Australia)\*, Brian Uy

**Finite element modelling of stainless steel shear connectors in composite beams;** Yifan Zhou (Australia)\*, Xinpei Liu, Brian Uy, Dongxu Li

**Numerical analysis of stainless steel-concrete composite beam-to-column joints with bolted flush endplates;** Yuchen Song (Australia)\*, Brian Uy, Jia Wang

**Numerical analysis of the load-moment interaction curves of high-strength composite columns;** Zhichao Huang (Australia)\*, Brian Uy, Dongxu Li

**Behaviour of large fabricated stainless steel beam-to-tubular column joints with extended endplates;** Jia Wang (Australia)\*, Brian Uy, Dongxu Li

**Behaviour and design of high-strength steel beam-to-column joints;** Dongxu Li (Australia)\*, Brian Uy, Jia Wang

### SESSION W5C 14:50-17:20 Room C (#301A)

#### Performance Evaluation of Concrete Structures subjected to Blast Loading (Hyo-Gyoung Kwak and Sung-Wook Kim)

Chairmen: Sung-Wook Kim and Young-Soo Yoon

**Shear strength of composite beams with steel angle-fabricated truss;** Kwangwon Jo (Korea)\*, Honggun Park

**In-Plane Cyclic Loading Behavior of Corner Steel-Reinforced Composite Walls;** Hyeon-Jin Kim (Korea)\*, Hong-Gun Park

**Protective structure with high-performance fiber-reinforced cementitious composites against armor piercing projectile;** Jae-Heum Moon (Korea)\*, Sung-Wook Kim, Won-Woo Kim, Dong-Hoon Lee, Joseph Roh, Dong-Joo Kim

**Numerical Analysis of RC Structural Members under Blast based on the Moment-Curvature Relation;** Seok Jun Ju (Korea)\*, Keun Chul Park, Hyo-Gyoung Kwak

**Nonlinear analysis of RC slab subjected to blast loading;** MinJoo Lee (Korea)\*, Hyo-Gyoung Kwak

**Enhancing impact resistance of concrete beams strengthened with high strength high ductility concrete;** Tian-Feng Yuan (Korea)\*, Jin-Seok Choi, In-Ji Han, Young-Soo Yoon

**Punching behavior of FRC slabs under drop-weight impact loading;** Jin-Young Lee (Korea)\*, Dae-Sung Jang, Kyung-Hwan Yun, Young-Soo Yoon

**Multiple microcracking behavior of ultra-high-performance fiber-reinforced concrete under high-rate direct tension: Investigation based on a digital image correlation technique;** Seoung Ik Choi, Min Kyoung Kim, Dong Joo Kim (Korea)\*, Yun-Kyu An

**Evaluation of SIFRCC Properties under High Strain Rate Through SHPB Test;** Cheolwoo Park (Korea)\*, Sung-Wook Kim, Jae-Heum Moon, Seungwon Kim

### SESSION W5D 14:50-17:20 Room D (#302)

#### Developments in Underground Space Technologies

Chairmen: Hyu-Soung Shin and Seongwon Hong

**Analytical study of the support pressure for the stability of shallow underground circular opening;** Tsuyoshi Nishimura (Japan)\*, Masanori Kohno, Masahiro Watariue, Kintoki Ogawa

**Behaviour of serviced tunnel and surrounding ground based on offset from divergence tunnel;** Soon Kyo Hong (Korea)\*, Dong Wook Oh, Suk Min Kong, Yong Joo Lee

**Damage estimation of ground frame structure due to tunnel excavation using indoor model test;** Kyoungmin Nam (Korea)\*, Jungjoo Kim, Hankyu Yoo

**Experimental study on side wall ventilation performance to improve smoke exhaust efficiency in tunnel;** Jinouk Park (Korea)\*, Sanghyun Byun, Jaehong Yoo, Yongho Yoo, Yang-Kyun Kim, Byungjik Park, Whiseong Kim

**Experimental study on fire behavior in sound barrier tunnel;** Yang-Kyun Kim (Korea)\*, Sang-Don Lee, Byung-Jik Park, Whi-Seong Kim, Jin-Ouk Park, Yong-Ho Yoo

**Numerical Analysis of Long-wavelength Elastic Wave Propagation in Jointed Rock Masses;** Ji-Won Kim (Korea)\*, Gye-Chun Cho, Song-Hun Chong

**Seismic reliability of high-speed railway considering composite damage types using 2004 M6.6 Niigata earthquake case history;** Dongyoun Kwak (Korea)\*, Seunghoon Yang, Tadahihiro Kishida

### SESSION W5E 14:50-17:20 Room E (#303A)

#### Smart Sensing and Processing for SHM (Sung-Han Sim)

Chairman: Sung-Han Sim

**Comparisons of mode shapes based damage detection methods for bending- and shear-type buildings;** Chia-Ming Chang (Taiwan)\*, Ho-Feng Chiang, Jau-Yu Chou

# TECHNICAL PROGRAM

**Damage detection of a thin plate using pseudo local flexibility method;** Ting-Yu Hsu (Taiwan)\*, Quang Vinh Pham, Wei Chen Chao, Yuan Sen Yang

**Energy dissipation and the dynamic response of a vehicle on deformable pavement with stochastic roughness;** Robin E. Kim (Korea)\*, Seunggu Kang, Billie F. Spencer, Jr., Imad Al-qadi, Hasan Ozer

**Crack identification method for concrete using RGB-D camera considering angle of view;** Sung-Han Sim (Korea)\*, Hyunjun Kim  
**Pedestrian Suspension Bridge Monitoring using Computer Vision and Deep Learning;** Jeonghyeok Lim, Hyungchul Yoon (Korea)\*

**Analysis of Local Stress Variation in Damaged Multi-strands Anchorage for Sensitively Optimal Impedance Measurement;** Ngoc-Loi Dang (Korea)\*, Quang-Quang Pham, Quoc-Bao Ta, Won-Bae Na, and Jeong-Tae Kim

**Concrete Crack Monitoring using Piezoelectric Smart Capsule: A Feasibility Study;** Quang-Quang Pham (Korea)\*, Ngoc-Loi Dang, Min-Jeong Kim, So-Young Lee, and Jeong-Tae Kim

**RECEPTION 18:00 – 19:30**  
**OCEAN VIEW in ICC JEJU 5th Fl.**

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**THURSDAY SEPTEMBER 19, 2019**

**REGISTRATION**  
**8:30 – 17:00**  
**ICC JEJU 3<sup>rd</sup> Fl.**  
**Conference Hall Lobby**

**KEYNOTE LECTURE IV**  
**(H1A, 09:00 – 09:35)**

**SESSION H1A** 9:00-9:35 Room A (Samda Hall)  
 Chairman: Hyung-Jo Jung

**Cement-based adsorbent and bio-concrete: Experiments and simulations;** H.K. Lee (Korea)

**KEYNOTE LECTURES V**  
**(H2A – H2B, 09:35 – 10:10)**

**SESSION H2A** 9:35-10:10 Room A (Samda Hall)  
 Chairman: Yong Joo Lee

**Digitalization in TBM-Tunnelling-automatization of rock mass classification and update of geological prognosis;** Thomas Marcher (Austria)

**SESSION H2B** 9:35-10:10 Room B (Samda Hall)  
 Chairman: Andrzej Winnicki

**Sustainable Urban Robotics Technologies for Smart Cities;** Hyun Myung (Korea)

**COFFEE BREAK**  
**10:10 – 10:30**  
**Lobby**

**CONCURRENT SESSIONS**  
**(H3A – H3F, 10:30 – 12:00)**

**SESSION H3A** 10:30-12:00 Room A (Samda Hall)  
**Elastic/acoustic Metamaterials: Novel Designs and Applications** (Rui Zhu, Guoliang Huang, Gengkai Hu and Yuesheng Wang)  
 Chairman: Rui Zhu

**Graded metamaterials for vibration attenuation in wide frequency range;** Eunho Kim (Korea)\*, Yeongtae Jang

**Isolating Low-Frequency Vibrations via Lightweight Embedded Metastructure;** Weijia Zhao (China)\*, Yitian Wang, Rui Zhu

**Low-frequency noise suppression using adaptive metamaterials;** Yunhong Liao (China)\*, Linlin Geng, Qinchun Hu, Yuchen Zhao, Xiaoming Zhou

**Asymmetric Elastic Wave Propagation in Tensegrity Metastructure Controlled by Prestress;** Yitian Wang (China)\*, Weijia Zhao, Xiaoning Liu, Rui Zhu, Gengkai Hu

**Broadband Wave Polarization Engineering based on single-polarized solid;** Mingye Zheng (China)\*, Rui Zhu, Gengkai Hu

**SESSION H3B** 10:30-12:00 Room B (Samda Hall)  
**Bridge Engineering and Design Code**  
 Chairman: Liming Zhou

**Three dimensional dynamic analysis on the joints between vertical shaft and tunnel;** Jung-Tae Kim (Korea)\*, Gye-Chun Cho, Eun-Soo Hong

**Image-Based Crack Detecting using Convolution Neural Network (CNN) with Less Data;** Jin Kim (Korea)\*, Gye-Chun Cho

# TECHNICAL PROGRAM

**Fire response of horizontally curved continuous composite bridge girders;** Gang Zhang, Chaojie Song (China)\*, Qiang Huang, Weifa Yao, Shuanhai He

**Study on Static and Dynamic Behavior of Bailey Bridge;** Thavone Khounsida (Japan)\*, Takafumi Nishikawa, Shozo Nakamura, Toshihiro Okumatsu, Khampaseuth Thepvongsa

**Moving-vehicle-excited bridge impact test and related structural identification theory;** Liming Zhou (China)\*, Jian Zhang

**A numerically parametric study on internal diaphragm connections between plates and box columns;** Eiichi Sasaki, Piseth Doung (Japan)\*

## SESSION H3C 10:30-12:00 Room C (#301A)

### Linear & Nonlinear Seismic Analysis Methods

Chairmen: Jenna Wong and Yulin Feng

**Equivalent hysteresis model for fiber elements of steel piers considering local instability effect;** Hanqing Zhuze (China)\*, Xu Xie

**Elastoplastic FEM analysis of earthquake response for the field bolt joints of a tower crane mast;** Yoshitaka Ushio (Japan)\*, Tomoharu Saruwatari, Yasuyuki Nagano

**Seismic Response of a 3-Story Green Roof Steel Structure;** Svetlana Tam, Jenna Wong (United States)\*

**Shaking table test for nonlinear dynamic shear force amplification of RC slender wall;** Sung Hyun Kim (Korea)\*, Hong-Gun Park

**Seismic behavior of pile-supported bridges considering SSI and structural non-linearity;** Muhammad Tariq Chaudhary (Kuwait)\*

**Seismic response of bridge-subgrade-CRTS II track system of High-Speed Railway under pulse-like strong motions;** Yulin Feng (China)\*, Lizhong Jiang, Wangbao Zhou, Binbin He, Leixin Nie

## SESSION H3D 10:30-12:00 Room D (#302)

### Improvements in Conventional Tunneling & Tunneling and Underground Works in Extreme Conditions

Chairmen: Thomas Marcher and Myung Sagong

**A study on the behaviour of single piles to adjacent shield tunnelling by considering the relative location of pile tips;** Young Jin Jeon (Korea)\*, Seung Chan Jeon, Sang-Joon Jeon, Cheol-Ju Lee

**Evaluation of cut methods for reducing the blasting vibration in NATM tunnel;** Seung-Joong Lee (Korea)\*, Byung-Ryeol Kim, Sung-Oong Choi, Nam-Soo Kim

**Discrete element analysis for the performance evaluation on screw conveyor of EPB shield TBM;** Soo-Ho Chang, Tae-Ho Kang, Soon-Wook Choi, Chulho Lee, Byungkwan Park (Korea)\*

**A Case Study on Design Change Considering Site Condition for two-Arch Tunnel in Singapore;** Myongho Choi, Seung Kwon, Seokbue Chang, Yonghyun Kwon (Korea)\*

**An Investigation of Tunnel Deformation Behavior Based on Excavation of Mountain Tunnels;** Shong-loong Chen (Taiwan)\*, Shen-Chung Lee, Jin-Sheng Chen

**Numerical Study for Evaluating Ground Stability at Offshore with Submerged Floating Tunnel;** Seok-Jun Kang (Korea)\*, Gye-Chun Cho

**Characteristics of momentum transfer depend on the focus geometry for waterjet rock cutting;** Yohan Cha (Korea)\*, Tae-Min Oh, Hyun-Joong Hwang, Kyoung-Youl Kim, Gye-Chun Cho

## SESSION H3E 10:30-12:00 Room E (#303A)

### Artificial Intelligence-based Structural Health Monitoring (Seunghee Park and Sung-Han Sim)

Chairmen: Seunghee Park and Sung-Han Sim

**Embedded sensor system for automated cable tension monitoring using deep learning;** Seunghoo Jeong (Korea)\*, Hyunjun Kim, Junhwa Lee, Sung-Han Sim

**Machine Learning based Tensile Force Estimation using Embeddable Elasto-magnetic Sensors;** Junkyeong Kim (Korea)\*, Seunghee Park

**Long-term Bridge Deflection Monitoring using Indirect Estimation with Strain and Computer Vision-based Measurements;** Junhwa Lee (Korea)\*, Kyoung-Chan Lee, Hyunjun Kim, Young-Joo Lee, Sung-Han Sim

**ANN-based model for monitoring bolted joint looseness using an Nd:YAG pulsed laser scanning system;** Dai Quoc Tran (Korea)\*, Kassahun Demissie Tola, Ju-Won Kim, Byoungjoon Yu, Seunghee Park

**Automated Structural Damage Detection for a Simple Beam Structure using Deep Convolutional LSTM;**

Jong-Woong Park (Korea)\*, Jongbin Won

**Development of Image based Mapping of Concrete bridge using Deepmatching;**

Jong-Woong Park, Jongbin Won (Korea)\*

## SESSION H3F 10:30-12:00 Room F (#303B)

### Computational Mechanics and Numerical Modeling

Chairman: Jin-Hak Yi

**Experimental study of the pool spreading due to continuous release of cryogenic liquids;** Myungbae Kim (Korea)\*, Le-Duy Nguyen

**Sustainable Design of Near Zero Energy Buildings;** Niloufar Ghazanfari (Switzerland)\*, Ilham Al-Shemmeri, Sassan Mohasseb

**Short Term Wind Speed Prediction Based on EMD and ARIMA;** Shengzhi Wu (China)\*, Quan Zhang

**Assessment of parameters affecting H-type wind turbine performance;** Pedro Antonio Assad Baracat (Brazil)\*, Kamal Abdel Radi Ismail

**Shale Mechanical Stability: Monitoring the Impact of Time Dependent Water and Ions Uptake;** Talal AL-Bazali (Kuwait)\*

## THURSDAY LUNCH

12:00 – 13:00

OCEAN VIEW in ICC JEJU 5<sup>th</sup> Fl.

## CONCURRENT SESSIONS

(H4A – H4F, 13:00 – 14:30)

## SESSION H4A 13:00-14:30 Room A (Samda Hall)

### The 2nd Joint NU-SNU-BOKU Seminar on the Design and Analysis of

**Innovative Structural and Geotechnical Systems I (Deuckhang Lee, Thomas Kang and Alfred Strauss)**

Chairmen: Deuckhang Lee and Alfred Strauss

# TECHNICAL PROGRAM

**Modeling of flexural- and shear-critical reinforced concrete specimens under drop weight impact;** Andrew Nghiem (Korea)\*, Thomas Kang

**Current Issue on Shear Design of Deep Prestressed Hollow-Core Slabs;** Deuckhang Lee (Kazakhstan)\*, Min-Kook Park, Kang Su Kim

**Shear Strength Model Specified in ACI 318: Engineering Review;** Dilyara Tlevkulova (Kazakhstan)\*, Bakty Tleugali, Dichuan Zhang, Thomas Kang, Deuckhang Lee

**Shear Strength Model Specified in ACI 318: Verification and Recommendation;** Dilyara Tlevkulova (Kazakhstan)\*, Bakty Tleugali, Hyunjin Ju, Jong Kim, Thomas Kang, Deuckhang Lee

**Automatic query-driven data processing system for Sentinel-2 remote sensing imagery products;** Dias Bakhtiyarov (Kazakhstan)\*, Zhandos Kerimkulov, Jong Kim

**Self-enhancement of automatic Tunnel Accident Detection (TAD) on CCTV by an AI deep-learning;** Kyu Beom Lee (Korea)\*, Hyu Soung Shin

**Metro train induced vibration measurement on buildings;** M. Bharathi, Dhiraj Raj, Yogendra Singh (India)\*

**Relevance of the concrete used for the support and lining in tunnels excavated through different rockmasses from safety, economic and environmental point of view;** Rafael Rodríguez (Spain)\*, Patricia Fernández, Fernando Pérez, Betariz Malagón

**Biopolymers for enhancing shear resistance of soil;** Yeong-Man Kwon (Korea)\*, Ilhan Chang, Gye-Chun Cho

**Evaluation of tunnel shaft dynamic behavior in liquefiable ground during earthquake;** Mintaek Yoo (Korea)\*, Sun Yong Kwon

**SESSION H4B** 13:00-14:30 *Room B (Samda Hall)*  
**Composite Materials & Structures I**  
*Chairmen: Krishanu Roy and Man-Tai Chen*

**Property analysis of 18th century brick lime mortar with 21st century brick cement mortar;** Rimanshu Goel (India)\*, Raju Sharma

**Study of Behavior of Plastic Modified Bitumen by Incorporating Carbon Black;** Ho Fai Wong (China)\*, Hao Jue Hong, Lai Ming Leung, Tsz Chun Fong, Yi Fei Shen, Tsz Hin Lo

**Impact of reinforcement to moment resistance of composite slabs;** Qingjie Zhang (Luxemburg)\*, Markus Schäfer, Wolfgang Kurz

**Experimental Study of High-Performance Manufactured Sand Self-Compacting Concrete and Application in CFST Deck Arch Bridge;** Wen-Qi Hou, Xiaoqian Yuan (China)\*, Yuhang Ren, Zhengxin Zhang

**Energy Harvesting Based on Vibration of Wind Turbine Blades Integrated with Piezoelectric Macro-Fibre Composite;** Tao Wen (United Kingdom)\*, Yu Shi, Yu Jia

**SESSION H4C** 13:00-14:30 *Room C (#301A)*  
**Bluff-Body aerodynamics**  
*Chairman: Peng Huang*

**Determination of Design Wind Loads on a Free Standing Wall Considering Climate Change;** Wonsul Kim (Korea)\*, Akihito Yoshida, Il Won Jung

**Numerical simulation of flow characteristics for three wind turbines with inverted-triangle distribution under yaw condition;** Haocheng Sun (China)\*, Peng Huang

**Comparison study of typhoon characteristics based on stationary and non-stationary models;** Wen Xie (China)\*, Huang Peng, Ming Gu

**Airflow over gable roof buildings with low roof slope: Wind tunnel experiments and CFD simulations;** Ruizhou Cao (China)\*, Zhixiang Yu, Zhixiang Liu, Xiaoxiao Chen, Fu Zhu

**Wind induced vibration analysis and resistant design of two adjacent steel stacks;** Wei Tan, Xiantao Fan (China)\*

**SESSION H4D** 13:00-14:30 *Room D (#302)*  
**Resilience and Sustainability in Underground Space**  
*Chairmen: Hangseok-Choi and Joon-Shik-Moon*

**SESSION H4E** 13:00-14:30 *Room E (#303A)*  
**Maintenance and Safety of Existing Infrastructures: Civil Engineering Applications**  
**(Seung-Seop Jin and Hyung-Jo Jung)**  
*Chairmen: Seung-Seop Jin and Hyung-Jo Jung*

**A novel finite element model updating using mixed-integer non-linear programming under model-form uncertainty;** Seung-Seop Jin (Korea)\*, Young-Soo Park, Sung-Tae Kim, Young-Hwan Park

**Estimation of Seismic Fragility Curve for Equipment in Nuclear Power Plant Structure with Nonlinear Behavior;** Heekun Ju (Korea)\*, Seung-Seop Jin, Hyung-Jo Jung

**Development of inspection system for prestressed concrete structures using AE technique;** Dong-Woo Seo (Korea)\*, Ki-Tae Park, Dong-Hyun Kim, Yoon-Gi Hong

**Towards creating an impedance based health monitoring method without using reference signature;** Wongi S. Na (Korea)\*, Jongdae Baek

**Finite Element Model Updating Considering Boundary Conditions Using Neural Networks;** Young-Soo Park (Korea)\*, Sung-Tae Kim, Young-Hwan Park, Kyusan Jung, Jong-Jae Lee

**SESSION H4F** 13:00-14:30 *Room F (#303B)*  
**Food and nutrition, pharmaceuticals and drugs, environment, energy and water fulfilling the basic necessities of human individuals I (Thomas Stahl)**  
*Chairman: Thomas Stahl*

**Quantitative measurement of rheological cell properties and the impact of drugs;** Haider Dakhil, Santanu Basu, Suhyang Lee, Imran Bashir, Andreas Wierschem (Korea)\*

**Potential Application of Innovative Gas Hydrate Technology in Fruit Juices Concentration Process;** Soebiakto Loekman (Korea)\*, Timo Claßen, Pia Seidl, Giovanni Luzi, Bernhard Gatternig, Cornelia Rauh, Antonio Delgado

**Phenomena, mechanisms and structures in wished and unwished foams of biological origin;** Bernhard Gatternig, Anuvar Osorio Nesme, Lidia Almazán Torres, Julian Thünnesen, Tobias Beck, Christopher McHardy, Thomas Bernstein, Giovanni Luzi, Thomas Stahl, Cornelia Rauh, Antonio Delgado (Korea)\*

**Virtual Engineering of a novel water desalination process utilizing hydrate technology;** Jawon Ha (Korea)\*, Giovanni Luzi, Soebiakto Loekman, Cornelia Rauh, Antonio Delgado

**Numerical study of a 5-generation Weibel lung compared to experiments;** Bastian Schoeneberger, Madeleine Koelbel (Germany)\*, Antonio Delgado



# TECHNICAL PROGRAM

**Novel baking concept based on the Volumetric Ceramic Burners VCB;** Vojislav Jovicic, Antonio Delgado (Korea)\*

**Process design and optimization of pulsed electric fields treatment of microalgae;** Justus Knappert, Christopher McHardy, Pauline Eppmann, Tobias Horneber, Alexander Jahn, Antonio Delgado, Cornelia Rauh (Germany)\*

**Numerical simulations of two-phase flow in photobioreactors;** Giovanni Luzi (Korea)\*, Christopher McHardy, Christoph Lindenberger, Cornelia Rauh, Antonio Delgado

## COFFEE BREAK

14:30 – 14:50

Lobby

## CONCURRENT SESSIONS

(H5A – H5F, 14:50 – 17:20)

**SESSION H5A** 14:50-17:20 Room A (Samda Hall)

**The 2nd Joint NU-SNU-BOKU Seminar on the Design and Analysis of Innovative Structural and Geotechnical Systems II**  
(Deuckhang Lee, Thomas Kang and Alfred Strauss)  
Chairmen: Deuckhang Lee and Thomas Kang

**Analysis of the steel structural reliability under the big data condition;** Yongfeng Fang (China)\*, Wenliang Tao

**Nonlinear Analysis of Shear Panel Elements;** Hyunjin Ju (Kazakhstan)\*, Alfred Strauss, Beatrice Belletti

**Critical Review of Shear Design Method for Concrete Members Specified in Russian SNiP Code: Proposed Modification;** Meirzhan Yerzhanov (Kazakhstan)\*, Hyunjin Ju, Sung-Woo Moon, Jong Kim, Deuckhang Lee

**Critical Review of Shear Design Method for Concrete Members Specified in Russian SNiP Code: Verification;** Aizhan Tukaziban, Meirzhan Yerzhanov (Kazakhstan)\*, Sung-Woo Moon, Dichuan Zhang, Deuckhang Lee

**Response of an Euler-Bernoulli Beam Resting on a Pasternak Foundation Subjected to Harmonic High-Speed Moving Loading;** Askar Ibrayev (Kazakhstan)\*, Desmond Adair, Jong Kim

**SESSION H5B** 14:50-17:20 Room B (Samda Hall)

**Composite Materials & Structures II**

Chairmen: Krishanu Roy and Man-Tai Chen

**Compression tests on cold-formed steel built-up box sections;** Krishanu Roy (New Zealand)\*, Heing Ho Lau, Boshan Chen, Tina Chui Huon Ting and James B.P. Lim

**Effect of screw spacing on axial strength of cold-formed steel built-up box sections-numerical investigation and parametric study;** Krishanu Roy (New Zealand)\*, Heing Ho Lau, Boshan Chen, Tina Chui Huon Ting and James B.P. Lim

**Experimental and numerical study of perforated cold-formed ferritic stainless steel unlipped channels subject to web crippling under interior-one-flange and end-one-flange loadings;** Amir Mohammad Yousefi (New Zealand)\*, James Lim, Charles Clifton

**Parametric studies and design recommendations of perforated cold-formed ferritic stainless steel unlipped channels subject to web crippling under interior-one-flange and end-one-flange loadings;** Amir Mohammad Yousefi (New Zealand)\*, James Lim, Charles Clifton

**Optimization of Sustainable residential building in Kuwait;** Ilham Saleh Al-Shemmeri (Kuwait)\*

**Short beam-column tests of cold-formed steel semi-oval hollow sections;** Man-Tai Chen (Hong Kong)\*, Ben Young

**Experimental and numerical investigation on seismic behavior of lattice steel-plate composite shear wall;** Ruibin Zhang (China)\*, Wei Wang, Qian Wu

**Parameter Study for the Simply-supported C/Z-section Purlins in Uplift Loading Incorporating the Modified Direct Strength Method;** Fan Bai (China)\*, Na Yang, Liusi Dai

**SESSION H5D** 14:50-17:20

Room D (#302)

**Innovation in Mechanized Tunneling**

Chairmen: Cheol-Ju Lee and Ki-Il Song

**Determination of Effective Parameters on Surface Settlement during Shield TBM;** Dongku Kim (Korea)\*, Khanh Pham, Sangyeong Park, Ju-Young Oh, Hangseok Choi

**Optimum EPB TBM operation considering different foam injection conditions;** Hyobum Lee (Korea)\*, Dahan Shin, Minkyu Kang, Dae-Young Kim, Hangseok Choi

**Tunnel Ahead Prediction on Tunnel face and side;** Chang-Ho Hong (Korea)\*, Min-Hyeong Lee, Gye-Chun Cho, Hee-Hwan Ryu

**Effect of standoff distance and abrasive flow rate on the removal volume for AWJ rock drilling;** Hyun-Joong Hwang (Korea)\*, Yohan Cha, Tae-Min Oh, Gye-Chun Cho

**Variable Density TBMs as a solution for tunneling in difficult ground and flexible TBM usage;** Ruben Duhme, Jean-Daniel Brabant (Singapore)\*

**Relationship between brittleness of rock, CAI and cutting performance of a TBM disc cutter;** Hoyoung Jeong (Korea)\*, Seungbum Choi, Sudeuk Lee, Seokwon Jeon

**Application of multivariate regression analysis for estimation of TBM utilization factor;** Tae Young Ko (Korea)\*, Yeong-Taek Pak, Seung-Mo Son, Taek-Kon Kim

**SESSION H5E** 14:50-17:20

Room E (#303A)

**Site Characterization**

Chairman: Hyeong-Joo Kim

**Measuring Shear Stiffness of Interface between Production Well and Sediments;** Chul-Wan Kang (Korea)\*, Gye-Chun Cho

**Empirical model on thermal conductivity for various conditions of sands;** Jun-Beom An (Korea)\*, Song-Hun Chong, Gye-Chun Cho

**Comparison of response and Fourier spectral ratios based on statistical analyses of strong motion records;** Haizhong Zhang (Japan)\*, Yan-gang Zhao

**Equations of Path Effects to simulate ground motions in Korean Peninsula using Point-source model;** Hyun Woo Jee (Korea)\*, Sang Whan Han

**A study on the behavior of deep and shallow foundations during earthquake and liquefaction;** Hyeong-Joo Kim, Tae-Woong Park, Hyeong-Soo Kim, Peter Rey Dinoy (Korea)\*

**Cyclic tests on squat RC shear walls with thick flanges;** Ju-Hyung Kim (Korea)\*, Hong-Gun Park

# TECHNICAL PROGRAM

**Dynamic analysis of a compressible soil of foundation reinforced by mixed-module columns (CMM) and stone columns;** Toufik Karech (Algeria)\*, Abdelkader Noui  
**Punching Shear Test of Footings considering Size Effect and Frictional Force;** Ju-Ok Noh (Korea)\*, Hong-gun Park

**SESSION H5F** 14:50-17:20 Room F (#303B)  
**Food and nutrition, pharmaceuticals and drugs, environment, energy and water fulfilling the basic necessities of human individuals II** (Thomas Stahl)  
 Chairman: Thomas Stahl

**Transgenic microalgae as green cell factories for the production of therapeutic proteins;** Khawaja Muhammad Imran Bashir (Korea)\*, Moo-Sang Kim, Andreas Wierschem, Man-Gi Cho  
**PVDF-based photoacoustic spectroscopy for the identification of clathrates;** Thomas Stahl (Korea)\*, Thomas Allan, James Guggenheim, Paul Beard

**Tackling obesity: Aeration as a novel approach to fat reduction in dairy products;** Christine Thomas (Germany)\*, Peter Schieberle, Jörg Hinrichs

**Ultra Low Cost Conventional and Single Use Hanging-Bag Photobioreactors from 3D Printed Parts;** Gamze Er, Man-Gi Cho, Christoph Lindenberger, Alexander Jahn (Korea)\*

**A simple technique to attach the OER catalyst on hematite photoanode for enhanced photoelectrochemical water splitting;** Antonio Delgado, Hyo-Jin Ahn (Korea)\*

**Seawater desalination by nanofiltration. Increase of productivity by surface modification of membrane;** Rodrigo Borquez, Manuel Melendrez, Luis Pino, Catalina Vargas (Chile)\*

**Viscous drag reduction: Groove-texturing applied to naturally developing boundary layer flow;** Jovan Jovanovic, Giovanni Luzi (Korea)\*

**Innovative tools and technologies to develop healthy and delicious food products: Prediction of mouth feeling;** Tobias Horneber, Phuong-Vy Nguyen, Anne Kathrin Baier, Antonio Delgado, Cornelia Rauh (Germany)\*

**BANQUET 18:00 – 20:00**  
**Booyoung Jeju Hotel & Resort**  
**(Sapphire B2F)**

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**FRIDAY SEPTEMBER 20, 2019**

**REGISTRATION**  
**8:30 – 10:00**  
**ICC JEJU 3<sup>rd</sup> FL.**  
**Conference Hall Lobby**

**CONCURRENT SESSIONS**  
**(F2A – F2E, 09:00 – 10:15)**

**SESSION F2A** 09:00-10:15 Room F (#303B)  
**Computational Mechanics and Numerical Modeling**  
 Chairman: Jin-Rae Cho

**Free Vibration of a Very-Large-Sag Extensible Catenary Riser;** Ong-art Punjarat (Thailand)\*, Somchai Chucheeepsakul  
**Nonlinear analysis of multi-layered composite beams including partial interaction effect;** Hyo-Jin Kim (Korea)\*, Phill-Seung Lee

**An internal crack detection method using machine learning algorithm;** Phill-Seung Lee, Sojin Shin (Korea)\*

**Natural Element Evaluation of SIFs in 2-D Isotropic Functionally Graded Materials;** Jin-Rae Cho (Korea)\*

**SESSION F2B** 09:00-10:15 Room G (#304)  
**Connections and Design Codes**  
 Chairman: Junsuk Kang

**Flexural behavior of bolted beam-to-column connections of steel storage racks;** Nattawut Asawasongkram (Thailand)\*, Prakrit Chomchuen, Prakrit Premthamkorn

**Steel structural design using nonlinear inelastic analysis;** Viet-Hung Truong, Seung-Eock Kim (Korea)\*

**Seismic analysis of high-rise steel frame building considering irregularities in plan and elevation;** Behzad Mohammadzadeh, Junsuk Kang (Korea)\*

**Finite element (FE) modelling of storage rack beam-to-upright connections;** Fan Bai, Liusi Dai (China)\*

**SESSION F2C** 09:00-10:15 Room C (#301A)  
**Concrete & RC Structures**  
 Chairmen: Chao-Wei Tang and Jafarli Parol

**Local bond-slip behavior of fiber reinforced LWAC after exposure to elevated temperatures;** Chao-Wei Tang (Taiwan)\*  
**Investigation of the effects of corrosion on bond strength of steel in concrete using neural network;** Nolan Camento Concha (Philippines)\*, Andres Winston Coronel Oreta

**Calculation of tensile force on mooring line for a submerged floating tunnel;** Gyu-Jin Kim (Korea)\*, Seonghun Kim, Hyo-Gyoung Kwak

# TECHNICAL PROGRAM

**Analysis of adhesive anchor connection in concrete using nonlinear continuum finite elements;** Jafarali Parol (Kuwait)\*, Jamal Al-Qazweeni, Shaikha Al-Sanad

**Experimental observations on bending creep in concrete beam;** Yong-Hak Lee, Seung-Gyu Kim (Korea)\*

**SESSION F2D** 09:00-10:15

Room D (#302)

## Smart Structural Systems

Chairman: Sujoy Mukherjee

**Dynamic modeling of biomimetic undulatory underwater propulsor actuated by ionic polymer metal composites;** Ankur Gupta (India)\*, Sujoy Mukherjee

**A study on the pinch mode of magnetorheological fluid flow;** Tae-hoon Lee, Byung-Hyuk Kang, Seung-bok Choi (Korea)\*

**A study on SH wave propagation in FGPM layered structure due to abrupt thickening and imperfect bonding at the interface;** Mriganka S. Chaki (India)\*, Abhishek K. Singh

**Real-time hybrid simulation based on vector form intrinsic finite element and FPGA;** Yuan-Feng Duan, Yi Fang (China)\*, Jun-Jie Tao, Hong-Mei Zhang, Chung-Bang Yun

**Adaptive Subset-based Digital Image Correlation for Micro-crack Evaluation;** Myungsoo Kang\*, Yun-Kyu An

**SESSION F2E** 09:00-10:15

Room E (#303A)

## Fluid-Structure Interactions I (Alam MD Mahbub)

Chairman: Alam MD Mahbub

**Experimental investigation on the galloping instability of a long-span suspension footbridge;** Ruwei Ma, Qiang Zhou (China)\*, Mingshui Li

**The near wake of three circular cylinders in an equilateral triangular arrangement at  $Re = 100$ ;** Honglei Bai (China)\*, Yufeng Lin, Md. Mahbub Alam

**Horizontal axis wind turbine review with emphasis on tower structural stability, failure issues, and remedial measures in practice in wind power industries;** S Rehman (Saudi Arabia)\*, Md. Mahbub Alam, Luai M. Alhems

**Confined flow around a square prism;** Ramnarayan Mondal (China)\*, Md. Mahbub Alam, C. M. Sewatkar

**Wave scattering by two submerged prisms over a finite step;** Ramnarayan Mondal (China)\*, Md. Mahbub Alam

## COFFEE BREAK

10:15 – 10:30

Lobby

## CONCURRENT SESSIONS

(F3A – F3E, 10:30 – 12:00)

**SESSION F3A** 10:30-12:00

Room F (#303B)

## Structural Dynamics and Control

Chairman: Simon H.F. Wong

**Fragility curves for buildings in Hong Kong;** Sung Hei Luk, Ho Fai Wong (Hong Kong)\*

**Dynamic characteristics of double-block ballastless track**

**subjected to a moving harmonic load;** Hao Fei, Zhi Sun (China)\*

**Forced frequency-multiplication vibration and resonance of single-span bridges under moving loads;** Zhi Sun (China)\*

**Comparative Analysis of Vibration Isolator with Quasi-zero Stiffness;** Huan Li (Australia)\*, Jianchun Li, Yancheng Li

**Seismic Performance of Steel Frame Structure with Energy-dissipative Columns;** Hesheng Tang, Yaqin Wu (China)\*, Zhuanghui Lin

**SESSION F3B** 10:30-12:00

Room G (#304)

## Understanding nano/bio Interfacial reactions in water and wastewater treatment (Sungjun Bae)

Chairman: Sungjun Bae

**Dual Functional Photoelectrochemical Systems for Water Treatment;** Wonyong Choi (Korea)\*

**Enhanced heavy metal adsorption by the surface grafted polyethylene/polypropylene fiber filter using oxygen plasma and acrylic acid;** Jeongmin Hong, Seungwoo Lee, Yuhoon Hwang (Korea)\*

**Removal of cyanide (CN-) in plating wastewater via electrochemical oxidation;** Xin Zhao (Korea)\*, Minsik Jang, Jin Woo Cho, Jae Woo Lee

**Comparison of counteranions for improvement of transport properties in electrodialysis treating plating wastewater;** Eun Joo Oh (Korea)\*, Joo Hyeong Kim, Jun Hee Ryu, Kyung Jin Min, Hyun-Gon Shin, Ki Young Park

**Microscopic Analysis of Catalytic Recombination Process;** Gisu Park, Rakesh Kumar, Yosheph Yang (Korea)\*, Sai Abhishek Peddakotla

**Estimation of greenhouse gas emissions from an underground wastewater treatment plant;** Daeseung Kyung (Korea)\*, Da-Yoon Jung, Seong-Rin Lim

**SESSION F3C** 10:30-12:00

Room C (#301A)

## Material Properties and Dynamic Behavior of Civil Engineering Structures and Systems (H.K. Lee)

Chairman: Sukhoon Pyo

**Effect of oxygen on fatigue strength of spinal implant made of  $\beta$  titanium alloys;** Yoon-Seok Lee (Japan)\*, Mitsuhiro Okayasu

**Floor vibration control of Nuclear Power Plants under Earthquake Vertical Excitations;** Chih-Shiuan Lin (Hong Kong)\*, Chang-Ching Chang, Yi-Hsuan Chen, Chi-Chang Lin

**Ultra-low cycle fatigue life prediction of Q345qC steel at different stress triaxiality;** Shuailing Li (China)\*, Xu Xie

**Dynamic and fatigue behavior of ultra high performance concrete (UHPC) railway sleepers;** Younghoon Bae, Sukhoon Pyo (Korea)\*

**Determining the Seismic Vulnerability Index of RC Buildings Based on NL- Parametric Analysis;** Moustafa Mofed Kassem (Malaysia)\*, Fadzli Mohamed Nazri, Ehsan Noroozinejad Farsangi

**Optimal system design of urban water transmission network for seismic performance enhancement;** Sungsik Yoon (Korea)\*, Young-Joo Lee, Hyung-Jo Jung

**An overview of supplementary cementitious materials addition on carbonation curing of cement based construction materials;** Rizwan Hameed (Korea)\*, Issam T. Amr, Bandar A. Fadhel, Rami A. Bamagain, Ali S. Al Hunaidy, Joonho Seo, Solmoi Park and H.K. Lee

# TECHNICAL PROGRAM

**SESSION F3D** 10:30-12:00 Room D (#302)

**Autonomous Bridge Inspection using Unmanned Aerial Vehicles and Deep Learning**

(Hyung-Jo Jung, Soojin Cho and Yun-Kyu An)

Chairmen: Soojin Cho and Yun-Kyu An

**Practical consideration for bridge inspection and condition assessment using unmanned aerial vehicles;** Hyung-Jo Jung (Korea)\*, Jin-Hwan Lee, Sungsik Yoon

**Autonomous Macro and Micro Bridge Inspection Using Aerial Vehicle Capable of Wall-Climbing;** Sungwook Jung (Korea)\*, Wancheol Myeong, Byeongho Yu, Chris Tirtawardhana, Seungwon Song, Jinkwang Kim, Junho Choi, Hyun Myung

**Optimization of Image data for bridge inspection based on vision system installed in Unmanned Aerial Vehicle;** Jin-Hwan Lee (Korea)\*, Hyung-Jo Jung

**In-situ Application of Deep Learning-based Crack Detection Technique to Real Bridges;** Soojin Cho (Korea)\*, Byunghyun Kim, Geonsoon Kim

**Deep learning-based digital crack map establishment of a high-rise bridge pier using a climbing robot system;** Keunyoung Jang (Korea)\*, Hyun Jin Bae, Byunghyun Kim, Soojin Cho, Yun-Kyu An

**Development of Bridge Inspection Support System using Unmanned Aerial Vehicle;** Jae-Bong Park (Korea)\*, Kyung-Soo Park, Chul-Min Kim, Tae-Jin Lee

**SESSION F3E** 10:30-12:00 Room E (#303A)

**Fluid-Structure Interactions II (Alam MD Mahbub)**

Chairman: Alam MD Mahbub

**LES of the flow around a finite-length square cylinder with free-end slot suction;** Lingwei Zeng (China)\*, Hanfeng Wang, Peng Si  
**Reynolds number effect on the wake of elliptical cylinder;** Xiaoyu Shi, Md Mahbub Alam (China)\*, Honglei Bai

**Three-dimensional DNS of vortex-induced vibrations of an inclined flexible cylinder near a plane boundary;** Chunming Ji, Zhimeng Zhang (China)\*, Md. Mahbub Alam, Dong Xu

**Effect of corner modification on flow characteristics of a 3d square cylinder;** Ahmad Hammad, Emad Uddin, Zaib Ali (Pakistan)\*, Syed Atif Iqbal, Muhammad Yamin Younis

**The wake structure of grooved cylinders in tandem;** J.F. Derakhshandeh, Md Mahbub Alam (China)\*



# TECHNICAL PROGRAM

## Poster Presentation

Poster Session: 10:00 AM - 06:00 PM  
Poster Presentation: 03:30 PM - 05:00 PM

**WEDNESDAY SEPTEMBER 18, 2019**

### POSTER SESSION I

**[Poster 1-1] Analysis on the Time-varying Fragility of Offshore Concrete Bridge;** Yan Liang, Jialei Yan (China)\*, Junlei Wang, Peng Zhang, Baojie He

**[Poster 1-2] A study on the behavior of geotextile-tube reinforced embankment laid on most liquefiable silty sand by shaking table test;** Hyeong-Joo Kim (Korea)\*, Tae-Woong Park, Hyeong-Soo Kim, Peter Rey Dinoy

**[Poster 1-3] Seismic performance of Japanese traditional old wooden house against a strong earthquake ground motion;** Tomiya Takatani (Japan)\*, Takashi Shimizu, Hayato Nishikawa

**[Poster 1-4] Injection capabilities of xanthan gum for soil grouting;** Jooyoung Im (Korea)\*, Ilhan Chang, Gye-Chun Cho

**[Poster 1-5] Numerical simulation of dynamic fracture in functionally graded materials using peridynamic modeling with composite weighted bonds;** Zhanqi Cheng, Zhibo Sui (China)\*, Hang Yin, Hu Feng

**[Poster 1-6] Effect of confinement with lateral reinforcement on normal & high strength concrete columns;** Mohamad Shanan (Egypt)\*, Kamal Metwally, Ahmad Anis, Ashraf El-zanaty

**[Poster 1-7] Automated Concrete Crack Detection and using Deep learning and Image Processing Method;** Ah-Ram Kim (Korea)\*, Yo-Seph Byun, Chanjun Chun, Donghyeon Kim, Seong-Won Lee

### POSTER SESSION II

**[Poster 2-1] Experimental study of the effect of the glass fibers on reducing collapse of a collapsible soil;** Nassima Bakir (Algeria)\*, Khelifa Abbeche, Gerard Panczer

**[Poster 2-2] Vehicle Vibration Analysis of High Speed Maglev under Track Deformation Excitation Based on PID Controller;** Jingyu Huang, Zhe Wei Wu (China)\*, Dongzhou Wang, Xiong Zhou, Weinan Xu, Xiangyun Kong

**[Poster 2-3] Deformation Analysis of High Speed Maglev Track Beam under Temperature Effect;** Jingyu Huang, Weinan Xu (China)\*, Xiong Zhou, Dongzhou Wang, Zhewei Wu, Xiangyun Kong

**[Poster 2-4] A Study on fire smoke behavior in a submerged floating tunnel;** Jae-Hyun Kim (Korea)\*, Ho-Hyung Lee, Hyo-Gyu Kim, Yoseph Byun, Ah-Ram Kim, Seong-Won Lee

**[Poster 2-5] The assessment of Fire Risk in Goyang city and Evaluation of regional economic impacts in case of fire in dangerous buildings;** Minsu Son (Korea)\*, Jiyoung Park, Hyun A Ko

**[Poster 2-6] Change of Groundwater Inflow by Cutoff Grouting Thickness and Permeability Coefficient;** Youngsang Kim, Joon-Shik Moon (Korea)\*

**[Poster 2-7] Stability evaluation of a double-deck tunnel with a diverging section;** You-Sung La, Bumjoo Kim (Korea)\*

**[Poster 2-8] Deformation patterns of tunnel bottom after tunnel construction under geological conditions of long-term deformation characteristics;** Nag-Young Kim (Korea)\*, Myoung-Il Kim, Hyuk-Sang Jung, Du-Hee Park

**[Poster 2-9] Mechanical behaviors of grouts under the blasting induced vibrations;** Myung Sagong (Korea)\*, Il Yoon Choi, Jun. S. Lee, Choong Sik Joh

### POSTER SESSION III

**[Poster 3-1] Tomography of Reinforced Concrete;** Vijayvenkatesh Chandrasekaran (India)\*

**[Poster 3-2] The effect of stochastic properties of strength function on time-dependent reliability;** Seyed Abbas Hosseini (Iran)\*, Naser Shabakhty

**[Poster 3-3] Numerical simulations for seismic responses of polar crane in nuclear power station;** Shouju Li (China)\*, Zhiyun Wang

**[Poster 3-4] Seismic resilience assessment for typical steel-concrete composite bridge systems;** Yang Liu (China)\*, Rui-Feng Duan, Zhu Mei, Da-Gang Lu

**[Poster 3-5] Post-hazard performance estimation of bridge transportation networks considering earthquake uncertainty;** Hye-Young Tak, Wonho Suh, Young-Joo Lee (Korea)\*

**[Poster 3-6] Numerical Study on Flexural Behavior of Structural Insulated Panels;** Yuthasak Ananthadejsak (Thailand)\*, Prakit Chomchuen

**[Poster 3-7] Numerical investigation on buckling behaviour of cold-formed steel channels with edge-stiffened web openings under axial compression;** Boshan Chen, Krishanu Roy (New Zealand)\*, Asraf Uzzaman, Gary Raftery, Charles Clifton, James Lim

**[Poster 3-8] Experimental investigation on buckling behaviour of cold-formed steel channels with edge-stiffened web openings under axial compression;** Boshan Chen, Krishanu Roy (New Zealand)\*, Asraf Uzzaman, Gary Raftery, Charles Clifton, James Lim

**[Poster 3-9] Experimental study on total shear strength for rock masses considering intermittent joints and connectivity rate;** Xili Yan (China)\*, Fengji Ji, Weifeng Duan, Xiaofei Feng, Yuchuan Shi, Jinming Zhang

# TECHNICAL PROGRAM

THURSDAY SEPTEMBER 19, 2019

## POSTER SESSION IV

**[Poster 4-1] Collapse Characteristics after Application of Reinforcement Method in Tunnel Construction in Large-scale Fault Zone;** Hyuk-Sang Jung (Korea)\*, Nag-Young Kim, Ji-Young Lee, Jae-Won Shim, Kang-Hyun Lee

**[Poster 4-2] Beam-spring analysis combined with back analysis algorithm for tunnel stability under operation;** Kyung-Nam Kang, Ki-il Song (Korea)\*, Joon-Sang An

**[Poster 4-3] Modelling of Rock Cracking Using Expansion of Vermiculite;** Chi-Hyung Ahn, Joung Woo Lee, Yong-Hoon Byun (Korea)\*

**[Poster 4-4] The experimental investigation on the strain rate influence on rock dynamic behaviours under freeze-thaw cycles;** L. Chen, H. Lin, J. Oh, Joon-Shik Moon (Korea)\*

**[Poster 4-5] Choosing effective design solution for fixing offshore hydrotechnical structures to shelf ground;** Latif Aslanov (Azerbaijan)\*

**[Poster 4-6] 3D Numerical Simulation of Stress and Strain Properties of Soil and Shield Tunnel during Excavation;** Tang Pan (China)\*, Huang Jingyu

**[Poster 4-7] Wear evaluation of TBM disc cutters using the discrete element method;** Byungkwan Park (Korea)\*, Chulho Lee, Soon-Wook Choi, Tae-Ho Kang, Soo-Ho Chang

**[Poster 4-8] Quantitative Assessment of Depth and Extent of Notch Brittle Failure in Deep Tunneling using Inferential Statistical Analysis;** Kang-Hyun Lee (Korea)\*, In-Mo Lee, Young-Jin Shin

**[Poster 4-9] Optimized waterjet parameters for overcutting generation of TBM;** Tae-Min Oh (Korea)\*, Gye-Chun Cho, Yohan Cha

**[Poster 4-10] Application of Modern Rock TBM for the construction of Dobongsan-Okjeong tunnel, Korea;** Seung-Joo Kwak (Korea)\*, Joo-Don Kim, Yong-Deok Park

## POSTER SESSION V

**[Poster 5-1] Electrokinetic remediation of cesium-contaminated soil and treatment of waste solution;** Ilgook Kim (Korea)\*, Sung-Man Kim, June-Hyun Kim, Chan Woo Park, Hee-Man Yang, In-Ho Yoon

**[Poster 5-2] LoRa based Bird and Deer Repulsion System in Farm;** Dong-Geun Lim (Korea)\*, Jinwoo Nam, Jin-Whi Jeong, Elijah T. Davis, Anthony H. Smith, Minsun Lee

**[Poster 5-3] Augmenting Structure for Noise Reduction in UAV;** Hanbum Ko, Yeeun Lee, Suyeon Jin (Korea)\*, Emma Kang, Nick Noonan, Minsun Lee, Michael J. Hopmeier, Eric T. Matson

**[Poster 5-4] Underground localization using the dual magnetic sensor for embedded directional drilling robot;** Hyunjun Lim (Korea)\*, Junseok Lee, Hyun Myung

**[Poster 5-5] Simulation Study on Multi-Robot Formation with Receding Horizon Particle Swarm Optimization;** Seung-Mok Lee (Korea)\*

**[Poster 5-6] UWB and 2D LiDAR-based indoor SLAM for UAVs in fire scenes;** Jieum Hyun (Korea)\*, Taekjun Oh, Hyun Myung

**[Poster 5-7] Deep learning-based crack detection using knowledge distillation;** Donghwa Lee (Korea)\*

**[Poster 5-8] Surface reaction of aqueous uranium (VI) with ferrous minerals: Vivianite and Green rust;** Youngho Sihn (Korea)\*, In-ho Yoon

**[Poster 5-9] Effects of organic concentrations on inorganic precipitation during electrodialysis of metal plating wastewater;** Jihyang Kweon (Korea)\*, Park Youngmin, Park Ki Young, Choi Su Young

**[Poster 5-10] Structural damage detection of truss structure using mode shape data;** Jun-Hyeok Song (Korea)\*, Dong-Ho Cho, Hee-Chang Eun

## POSTER SESSION VI

**[Poster 6-1] On flood simulation of lower reach of the Yura-gawa River by finite volume method;** Tomiya Takatani (Japan)\*, Yoshikazu Tsukahara

**[Poster 6-2] Design principle of gradient structure for promoting better heat transfer between highly mismatch materials;** Guo Chang (China)\*, Hailong Zhang

**[Poster 6-3] Experimental investigation of organic fouling mitigation in dead-end filtration and removal by magnetic iron oxide particles;** Jaehyun Jung (Korea)\*, Mark Sibag, Bora Shin, Jinwoo Cho

**[Poster 6-4] Water absorption of Elements for the facade Building Industry with cement composites containing TiO<sub>2</sub>;** Mehdi Nezhadnaderi (Iran)\*, Sayedeh Fatemeh Khoshkalam Soleimandarabi, Raheleh Rostami

**[Poster 6-5] Development of Automatic Emission Manufacturing Facility for unattended automatic inspection of Blood Collection Tube;** Sung Sik Nam (Korea)\*, Lida Heng, Jeong Su Kim, Tae Chul Park, and Sang Don Mun

**[Poster 6-6] Study on Magnetic Abrasive Finishing Characteristics of Nitinol Wire Using a Rotational Magnetic Field;** Jeong Su Kim (Korea)\*, Cheng Yin, Jing Fu Hou, Lida Heng and Sang Don Mun

**[Poster 6-7] Assessment Model of Single Crack in Railway Tunnel Based on Fuzzy Sets Concept;** Yiding Zhao, Yao Shi, Shouhua Liu (China)\*, Junsheng Yang, Rui Sun

**[Poster 6-8] Probabilistic range prediction of ultimate strength of corroded seven-wire strands;** Jaebeom Lee, Chang-Su Shim, Young-Joo Lee (Korea)\*

**[Poster 6-9] Thermodynamically Predicting the Impact of Temperature on the Performance of Drilling Bits as a Function of Time;** Talal AL-Bazali (Kuwait)\*

**[Poster 6-10] Travel Time Prediction on Urban Roadways Using ANN with Neighboring Sections Relationship;** Porntep Puangprakhon (Thailand)\*, Sorawit Narupiti

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Yuan, Xiaoqian	H4B*		
Yu, Byeongho	F3D		
Yu, Byoungjoon	H3E		
Yu, Zhixiang	H4C		
Yun, Chung-Bang	W4E,F2D		
Yun, Kyung-Hwan	W5C		
Zareifard, Mohammad Reza	W4D*		
Zeng, Lingwei	F3E*		