

## April 2 (Monday)

### Opening Ceremony (09:00~09:15)

### Plenary Session I (09:15~11:00)

1. Prof. Chung Bang Yun (9:15~9:50) Room # Convention hall
2. Prof. Nao-Aki Noda (9:50~10:25) Room # Convention hall
3. Prof. Shinji Nishiwaki (10:25~11:00) Room # Convention hall

### Coffee Break (11:00~11:30)

### SESSION M1601: (11:30~13:00), *Room 601, 6th Fl*

#### **Numerical and Experimental Approaches on Smart Materials for civil infrastructure systems**

**Chairman : Muhammad Salman Haider (KAIST)**

- M1601-1. **(Invited Talk)** M.S. Haider, H.R. Khalid, and H.K. Lee (KAIST, Korea), Highly stretchable and flexible nanocomposite piezoresistive pressure sensors: a review
- M1601-2. H.Y. Kim, H.M. Son, J.H. Seo, and H.K. Lee (KAIST, Korea), An overview on the effect of temperature and salinity on microbial induced calcium carbonate precipitation of *Sporosarsina pasteurii*
- M1601-3. S.H. Kim, J.H. Seo, S.M. Park, Issam T. Amr, Bandar A. Fadhel, Ali S. Hunaidy, Rami A. Bamagain and H.K. Lee (KAIST, Korea) An overview on the microstructural evolution of portland cement after carbonation curing and steam curing
- M1601-4. B. F. Haile, D. W. Jin and H. K. Lee (KAIST, Korea), Micromechanics based study on the effect of aggregate size and fiber geometry on the mechanical properties of UHPC
- M1601-5. I. Choudhry, H.R. Khalid, and H.K. Lee (KAIST, Korea), A review on factors affecting the performance and efficiency of dielectric elastomer generators

### SESSION M1602: (11:30~13:00), *Room 602, 6th Fl*

#### **Isogeometric Analysis and Design Optimization**

**Chairman : Youn Doh Ha, Bongyong Koo (Kunsan National University)**

- M1602-1. **(Invited Talk)** S.-H. Ha (Korea Maritime and Ocean Univ.), Topology optimization with discrete object projections

- M1602-2. M. Yoon, T. Lee, and B. Koo (Kunsan Nat'l Univ., Korea), Shape design sensitivity analysis of displacement-loaded thermal structures employing a boundary integral equation (BIE) method in an isogeometric approach
- M1602-3. H. Cho and K.K. Choi (Mokpo Nat'l Univ., Korea), Iterative most probable point search method for problems with mixture of random and interval variables
- M1602-4. M.G. Kim, B.Y.Koo (Korea Inst. of Machinery & Materials), Isogeometric shape optimization for multipatch NURBS model using Nitsche's method
- M1602-5. J. Noh, Y.D. Ha (Kunsan Nat'l Univ., Korea), Geometrically exact isogeometric multi-patch shell analysis

**SESSION M1603:** (11:30~13:00), *Room 603, 6th Fl*

**Advances and Applications in Modern Discretization Methods**

**Chairman :** *Hyun-Gyu Kim (Seoul National University of Science and Technology),  
Chongmin Song (University of New South Wales)*

- M1603-1. **(Invited Talk)** Chongmin Song (University of New South Wales, Australia), Integrating geometric models in stress analysis by the scaled boundary finite element method
- M1603-2. H.-Y. Kim, H.-G. Kim (SEOULTECH, Korea), A new polyhedral finite element based on quadratic interpolations
- M1603-3. S. Nguyen-Hoang, Hyun-Gyu Kim (Seoul National University of Science & Technology, Korea), Level-set based shape optimization using polyhedral elements
- M1603-4. H.N.T. Thuan, and H.G. Kim (Seoul National University of Science & Technology, Korea), A development of polygonal finite shell element and its application to coupling non-matching meshes
- M1603-5. Long C. Nguyen, H. Nguyen-Xuan (Hutech university), Deep learning for computational structural optimization

**SESSION M1604:** (11:30~13:00), *Room 604, 6th Fl*

**Building Modeling/Management/Construction/Design BIM I**

**Chairman :** *Jae Ho Lee (GS E&C)*

- M1604-1. **(Invited Talk)** J.H. Lee, J.Y. Cho, J.H. Park, and J.H. Jung (GS E&C, Korea), Case study on the applicability of BIM process for railway construction
- M1604-2. J.H. Han, C.W. Lee, S.G. Kim, and S.H. Nam (ENGSOFT, Korea), Development of framework for railway infrastructure design work
- M1604-3. D.J. Jang and S.A. Kim (Sungkyunkwan Univ., Korea), Structural and spatial

- performance optimization of steel structures using topology optimization
- M1604-4. J.H. Park, M.T. Amores, K.H. Park, and J.S. Won (Korea National University of Transportation), An integration between the process mairing method and building information modeling (BIM): a case study in Singapore
- M1604-5. H.J. Park, M.B. Seo (Korea Institute of Civil Engineering and Building), A development of BIM prototype libraries for railway infrastructure

**SESSION M1605:** (11:30~13:00), *Room 605, 6th Fl*

**CAE and Applications I (Composite Materials)**

**Chairman :** *Heoung Jae Chun (Yonsei University), Naoki Takano(Keio University)*

- M1605-1. **(Invited Talk)** Wiedae Kim, Eunsung Choi, Taewhan Kim, Sunwon Kim (Pusan National Univ., Korea), Spring-in analysis of composite material after cure
- M1605-2. V.H. Truong, B.S. Kwak, and J.H. Kweon (Gyeongsang National Univ., Korea), Failure load prediction of C-shaped composite beams using cohesive zone model
- M1605-3. T.D. Hoang, N. Takano (Keio Univ, Japan), Stochastic homogenization analysis of multi-phase composite materials based on the first-order perturbation method
- M1605-4. S.R. Lee, J.Y. Lee, B.G. Ryu, and S.H. Ryu (KAIST, Korea), A micromechanics-based analytical soltion for the effective thermal conductivity of composites with orthotropic matrices and interfacial thermal resistance
- M1605-5. B.J. Pak, Y.B. Park, I.P. Hong, and H.J. Chun (Yonsei Univ., Korea), Structural stability analysis of radome with liquid tuned FSS

**SESSION M1606:** (11:30~13:00), *Room 606, 6<sup>th</sup> Fl*

**Structural Optimization I**

**Chairman :** *Gil Ho Yoon(Hanyang University), Shinji Nishiwaki (Kyoto University)*

- M1606-1. **(Invited Talk)** K.H. Kim, G.H. Yoon (Hanyang Univ., Korea), Acoustic topology optimization considering aeroacoustic noise source
- M1606-2. S. Lim, R. Misawa, S. Maruyama, T. Yamada, K. Izui, and S. Nishiwaki (Kyoto Univ., Japan), Lightweight design for automotive component using multi-material level set-based topology optimization
- M1606-3. K. Furuta, A. Sato, K. Izui, T. Yamada, M. Matsumoto and S. Nishiwaki (Kyoto Univ., Japan), Structural optimization for two-phase nanoscale heat conduction problems

- M1606-4. Chunghee Yoon and Gil Ho Yoon (Hanyang Univ., Korea), Topology optimization of acoustic structure with non-matching meshes
- M1606-5. J.W. Lee, J.J. Kim, H.S. Kim, and G.H. Yoon (Hanyang Univ., Korea), New topology optimization method for composite material based on layerwise theory

**SESSION M1607:** (11:30~13:00), *Room 607, 6th Fl*

**Computational Methods in Structural Dynamics I**

**Chairman :** *J.W. Park (ChungAng University), Seung-Seop Jin(KAIST)*

- M1607-1. **(Invited Talk)** J.W. Park, and S.H. Sim (Chung-Ang Univ., Korea) Neutral axis estimation for structural condition assessment
- M1607-2. J.B. Won, and J.W. Park (Chung-Ang Univ., Korea), Strain sensing using wireless smart sensors for long-term bridge monitoring
- M1607-3. Y.M. Hwang, S.S. Jin, H.Y. Jung, and H.J. Jung (KAIST, Korea), FE model updating with the mutli-obejctive optimization based on the surrogate model
- M1607-4. M.Z. Sarwar, and J.W. Park (Chung-Ang Univ., Korea), Ultra low power smart wireless sensor with event based operation
- M1607-5. J.C. Park, I.H. Kim, and H.J. Jung (KAIST, Korea), Feasibility study of wind pressure fluctuation on a high-rise building for an electromagnetic energy harvesting device
- M1607-6. H.S. Kim, J.H Choi (Korea Aerospace Univ., Korea), Statistical model calibration and validation of elasto-plastic analysis in pyrotechnically actuated devices based on operating mechanism

**Lunch (13:00~14:20)**

**SESSION M2601:** (14:20~15:50), *Room 601, 6th Fl*

**Advances and Applications in Material Point Method**

**Chairman :** *Hyun-Gyu Kim (Seoul National University of Science and Technology),  
Xiong Zhang (Tsinghua University)*

- M2601-1. **(Invited Talk)** Y.C. Yoon (Myongji College, Korea), Inelastic material modeling for particle difference method
- M2601-2. Y.J. Cheon and H.G. Kim (Seoul National University of Science & Technology, Korea), Development of an adaptive material point method coupled with a phase filed model for analyzing damage process and crack propagation
- M2601-3. T.S. An, Y.D. Ha (Kunsan National Univ., Korea), Impact fracture simulation for

multilayered glass structures with peridynamic ghost interlayer model

M2601-4. YuZhe Liu, XinMing Qiu, T.X. Yu (Tsinghua Univ., China), Simulation of woodpecker's impact brain injury by MPM

**SESSION M2602:** (14:20~15:50), Room 602, 6th Fl

**Waves-Modeling Simulation and Applications**

**Chairman : Jun Won Kang (Hongik University)**

M2602-1. **(Invited Talk)** T. Maruyama, T. Touhei (Tokyo University of Science, Japan), Numerical continuation approach for steady-state wave scattering by a crack with contact acoustic nonlinearity

M2602-2. S. Youn, J.W. Kang (Hongik Univ., Korea), A spectral element method for transient simulation of SH-waves

M2602-3. B. Kim, J.W. Kang, S. Kee, H. Jeong (Hongik Univ., Korea), An elastic wave full-waveform inversion method for a B-scan subsurface imaging

M2602-4. N.Q. Xuan, P.C. Vinh, and D.K. Lee (Sejong Univ., Korea), The rayleigh wave formulations with impedance boundary conditions

M2602-5. Duy-Duan Nguyen and Tae-Hyung Lee (Konkuk Univ., Korea), Correlation between seismic responses of RC bridges and earthquake intensity measures considering high and low frequency contents of earthquakes

M2602-6. J. Lee, Y. Cho (Pusan National Univ, Korea), Analysis of propagation characteristics of interface wave for the shrink fit nozzle

**SESSION M2603:** (14:20~15:50), Room 603, 6th Fl

**Characterization, Modeling and Design of Composite Materials with Heterogeneous Nano/Microstructure**

**Chairman : Gunjin Yun (Seoul National University)**

M2603-1. J.-S. Kim, S.-Y. Kim and T.-S. Han (Yonsei Univ., Korea), Effect of uncertain void distributions on material responses

M2603-2. S.Y. Kim and T.S. Han (Yonsei Univ., Korea), Extended stochastic optimization for constructing virtual ITZ specimens and evaluation of their properties

M2603-3. T.-S. Han and J.-S. Kim (Yonsei Univ., Korea), Statistical approach for microstructure characterization and properties evaluation of cement paste

M2603-4. K.S. Jang, and G.J. Yun (Seoul National Univ., Korea), Appraisal of deep learning for material constitutive models

**SESSION M2604:** (14:20~15:50), *Room 604, 6th Fl*

**Building Modeling/Management/Construction/Design BIM II**

**Chairman :** *Jaechol Lee (Tongmyong University)*

- M2604-1. **(Invited Talk)** J.C. Lee (Tongmyong Univ., Korea), Implementing structural analysis using BIM-based building information
- M2604-2. J.H. Jung (Kyungnam Univ., Korea), Case study on the representation of rebars in IFC
- M2604-3. Khuvilai Erdene, S.H. Lee (Yonsei Univ., Korea), Infrastructure asset management: railway track maintenance ontology
- M2604-4. K.-W. Seo, S.I. Park, and S.-H. Lee (Yonsei Univ., Korea), Extension and verification of data schema for railway infrastructure information model
- M2604-5. Suncheol Na, HyunCheul Yang, and Jaewook Lee (Sejong Univ., Korea), Design performance evaluation with BIM-based spatial patterns

**SESSION M2605:** (14:20~15:50), *Room 605, 6th Fl*

**CAE and Applications II (Composite Materials and Biomechanics)**

**Chairman :** *Heoung Jae Chun (Yonsei University)*

- M2605-1. G.Y. Choi, H.J. Chun, J.I. Choi, H.S. Jang and J.C. Park (Yonsei Univ., Korea), The study about the effect of clamping torque applied to bolted joint on the characteristic length of composite
- M2605-2. S.M. Hasheminia, H.J. Chun, J.C. Park, and H.S. Chang (Yonsei Univ., Korea), Effect of design parameters on stress sharing and failure mechanism of hybrid joints
- M2605-3. D.Y. Jeong and H.J. Chun (Yonsei Univ., Korea), Biomechanical analysis of effects on the spine during gait using inverse dynamics

**SESSION M2606:** (14:20~15:50), *Room 606, 6th Fl*

**Structural Optimization II**

**Chairman :** *Gil Ho Yoon (Hanyang University), Xu Guo (Dalian University)*

- M2606-1. **(Invited Talk)** J.W. Lee and G.H. Yoon (Hanyang Univ., Korea), Topology optimization considering stress propagation under impact load
- M2606-2. Chang Liu, Weisheng Zhang, Xu Guo (Dalian University of Technology, China), Additive manufacturing-oriented shell-infill graded lattice structures design through explicit topology optimization

- M2606-3. J.H. Yoon and G.H. Yoon (Hanyang Univ., Korea), Change of dissipated energy of mechanical metamaterial according to hole shape and size
- M2606-4. Riye Xue, Chang Liu, Weisheng Zhang, Yichao Zhu, Shan Tang, Zongliang Du, Xu Guo (Dalian University of Technology, China), Explicit structural topology optimization under finite deformation via moving morphable void (MMV) approach
- M2606-5. Weisheng Zhang, Xu Guo (Dalian University of Technology, China), A moving morphable void (MMV)-based explicit approach for topology optimization considering stress constraints

**SESSION M2607:** (14:20~15:50), *Room 607, 6th Fl*

**Computational Molecular Mechanics**

**Chairman : B.J. Choi (Sungkyunkwan University)**

- M2607-1. **(Invited Talk)** B. Choi, and K. Eom (Sungkyunkwan Univ., Korea), Nanomechanics of amyloid fibrils
- M2607-2. C. Lee, J. Y. Lee, and D.-N. Kim (Seoul National Univ., Korea), Nanomechanical test and analysis of DNA origami-based hinge structures
- M2607-3. G. Yun, J. Kim, J. Lee, and D.-N. Kim (Seoul National Univ., Korea), Finite element procedures for protein dynamics
- M2607-4. Y. Kim, M. Lee, I. Baek, T. Yoon and S. Na (Korea Univ., Korea), Presence of weak components in spider silk making silk tougher by adapting to harsh hydration conditions

**Short Break (15:50~16:00)**

**Semi-Plenary Session I (16:00~16:25)**

1. Prof. Xiong Zhang (16:00~16:25) Room #600A
2. Prof. HeeCheul Kim (16:00~16:25) Room #600B

**Coffee Break (16:25~16:45)**

**SESSION M3601:** (16:45~18:15), *Room 601, 6th Fl*

**Innovative Issues on Building Members and Joints**

**Chairman : Heecheul Kim (Kyung Hee University)**

- M3601-1. **(Invited talk)** Dinh Han Nguyen, J.D. Nzabonimpa, and W.-K. Hong (Kyung Hee Univ., Korea), Idealization of plastic flow of composite steel beams encased in concrete
- M3601-2. H.-J. Son, Y.H. Kim, Heecheul Kim, and D.-J. Kim (Kyung Hee Univ., Korea), Structural performance of a truss deckplate system with high-strength mortalinfilled truss bars
- M3601-3. J.-W. Yoo, J.-E. Jeong, K.-S. Choi, and D.-J. Kim (Kyung Hee Univ., Korea), Accurate and effective finite element modeling of greenhouse frame joints
- M3601-4. J.Y. Park, J.S. Lee, K.S. Jang, and Heecheul Kim (Built Environment Technology Center, Korea), Experimental study on the friction coefficients of the sliding materials for bridge bearings
- M3601-5. Younjong Yoo, Jeomhan Kim, Heecheul Kim (CROSS STRUCTURAL CONSULTANT Co. Ltd, Korea), A study on the connections of CFT column to rigid beams with cross-shaped stiffeners
- M3601-6. M.S. Kim, C.H. Yoon, Heecheul Kim, and Y.H. Lee (Kyung Hee Univ., Korea), Development of post-tensioned circular anchorage

**SESSION M3602:** (16:45~18:15), *Room 602, 6th Fl*

**(Speical Session) Smart Submerged Floating Tunnel Systems Research Center**

**Chairman : Deokhee Won (KIOST),**

- M3602-1. **(Invited Talk)** D.H. Won, J.H. Seo, and W.S. Park (KIOST, Korea), Bending behavior of composite hollow RC for submerged floating tunnel system
- M3602-2. J.W. Kim, J.T. Kim, and G.C. Cho (KAIST, Korea), Monitoring of grouted subsea sediments using geophysical techniques
- M3602-3. J.Y. Hwang, H.-G. Kwak (KAIST, Korea), Numerical analysis for fire-damaged RC structural members considering after-cooling behavior
- M3602-4. S. Lee, J.W. Jung, K. Ko, and J.W. Hong (KAIST, Korea), Parameter optimization for blast analysis using ALE method
- M3602-5. T. Karoui, Y.H. Jeong, D.S. Kim (KAIST, Korea), Submerged floating tunnel: geotechnical issues and solutions
- M3602-6. J.H. Seo, D.H. Won, and W.S. Park (KIOST, Korea), Behavior of inter-cell for open-cell caisson breakwater system

**SESSION M3603:** (16:45~18:15), Room 603, 6th Fl

**Concrete and Computational Design**

**Chairman : H.S. Kim (Konkuk University),**

**S.Y. Seo (Korea National University of Transportation)**

- M3603-1. **(Invited Talk)** H.S. Kim (Konkuk Univ., Korea), Multi objective optimization of dual purpose outriggers in tall concrete buildings
- M3603-2. H.C. Cho, H. Kang, S. J. Han, S. H. Lee and K.S. Kim (University of Seoul, Korea), Remaining service life evaluation methodology of concrete buildings based on neuro-fuzzy theory
- M3603-3. M.J. Kwon, T.K. Kim, S.W. Hong, and J.H.J. Kim (Yonsei Univ., Korea), RC arch deck performance evaluation and simulation for enhanced deck width
- M3603-4. Y.C. Park, J.J. Lee, D.H. Son, and C.S. Choi (Hanyang Univ., Korea), An analytical study on ductility capacity of steel fiber reinforced concrete column
- M3603-5. H.T. Kim, T.H. Kwon, and K. Park (Yonsei Univ., Korea), Response of reinforced concrete members in neutron irradiation environment
- M3603-6. S.J. Jang, H.D. Yun, J.H. Kim, G.Y. Jeong, and M.H. Lee (Chungnam National Univ., Korea), Nonlinear finite element analysis of diagonally reinforced coupling beams with steel fiber-reinforced concrete
- M3603-7. J.W. Lim, S.Y.Seo (Korea National University of Transportation, Korea), Analytical evaluation on the structural capacity of RC beam strengthened with NSM FRP
- M3603-8. I.A.D.C.Idirimanna and P.Thammarak (AIT, Thailand), Damage detection by normalized modal strain in structural walls

**SESSION M3604:** (16:45~18:15), Room 604, 6th Fl

**Super-Tall Building R&BD Center**

**Chairman : C.K. Kim (Dankook University), S.H. Lee (Dankook University)**

- M3604-1. **(Invited Talk)** D.H. Mun, S.H. Lee (Dankook Univ., Korea), Comparison of modal properties using ambient and forced vibration test
- M3604-2. J.E. Rho, S.H. Lee (Dankook Univ., Korea), Optimal design of a multi-action hybrid damper
- M3604-3. S.J. Heo, S.H. Lee (Dankook Univ., Korea), Deformation measurement and system identification of 5-story test towers using video analysis
- M3604-4. M.J. Jeon, S.H. Lee (Dankook Univ., Korea), System identification of a 5-story steel frame structure with close translational and torsional natural frequencies
- M3604-5. C.Y. Pak, S.H. Lee, D.H. Mun and Y.H. Lee (Dankook Univ., Korea), The optimal design of tuned mass damper with viscous and friction damping through computer simulation
- M3604-6. J.J. Lim, T.S. Eom (Dankook Univ., Korea), Evaluation of compressive strength

of CFT columns using thin-walled steel tube

**SESSION M3605:** (16:45~18:15), Room 605, 6th Fl

**CAE and Applications III (Material Behavior and Dynamics)**

**Chairman :** *Heoung Jae Chun (Yonsei University),*

*Yoon Young Kim (Seoul National University)*

- M3605-1. **(Invited Talk)** J. H. Min, K. S. Oh and J. W. Lee (Ajou Univ., Korea), Sub-chamber design in a muffler for duct noise reduction multi-frequency bands
- M3605-2. D.-M. Kim, S. Choi, G.-W. Jang, and Y.Y. Kim (Seoul National Univ., Korea), Higher-order beam theory (HOBT) based buckling analysis for thin-walled box beams
- M3605-3. C.S. Shim (Chung-Ang Univ., Korea), Implementation of BIM for expressway projects
- M3605-4. J. Lee, Y. Yoo, and Y. Choi (Chung-Ang Univ., Korea), High velocity impact and penetration of projectile on granite

**SESSION M3606:** (16:45~18:15), Room 606, 6th Fl

**Advances in Structural Systems and Engineering**

**Chairman :** *Hwanwoo Lee (Pukyong Univ.), Phill-Seung Lee (KAIST)*

- M3606-1. **(Invited Talk)** P.S. Lee, S. Kim, H.J. Kim, D.H. Lee, and C. Lee (KAIST, Korea), Introduction to recent finite element technologies for analysis of solids, shells and beams
- M3606-2. G.K. Park, and H.G. Kwak (KAIST, Korea), Evaluation of resisting capacity of a RC column subjected to blast loads
- M3606-3. G.Y. Lee, J.M. Kim, and H.K. Kwak (Mokpo National Maritime Univ., Korea), Collision behaviors analysis of sandwich concrete panel for outer shell of LNG tank
- M3606-4. E.T. Park, K.S. Choi, Y.U. Park, H.W. Lee (Pukyong National Univ., Korea), Fundamental experiment to verify the sensing resolution on the internal stress of prestressed concrete
- M3606-5. H. C. Noh (Sejong Univ., Korea), Consideration of material uncertainty in dynamic systems using central difference direct integration
- M3606-6. H.J. Chung and K.H. Paik (Jeonju Univ., Korea), Parametric study for optimal design of prestressed concrete filled steel tube piles

**SESSION M3607:** (16:45~18:15), *Room 607, 6th Fl*

**Structural Monitoring and Control**

**Chairman :** *Chung-Bang Yun(Zhejiang University),*

*Yuanfeng Duan(Zhejiang University)*

- M3607-1. **(Invited Talk)** R. Zhang, Y.F. Duan, and Y. Zhao (Zhejiang Univ., China), EME sensors for stress monitoring of steel cables
- M3607-2. J.H. Yi, W. Kim, I.K. Min, and J.S. Shim (KIOST, Korea), Long-term and short-term monitoring of dynamic responses of Socheongcho ocean research station
- M3607-3. J.Q. Tu, X. Xu, C.B. Yun (Zhejiang Univ., China), Nonlinear ultrasonic waves-based damage detection on I-shaped girder
- M3607-4. P. Zhang, Z. Tang, C.B. Yun, and Y.F. Duan (Zhejiang Univ., China), Ultrasonic guided wave inspection for suspender cables in arch bridge
- M3607-5. J.J. Tao, Y.F. Duan, H.M. Zhang, and C.B. Yun (Zhejiang Univ., China), A parallel framework for real-time hybrid simulation based on vector form intrinsic finite element method and field-programmable gate array
- M3607-6. Z. Ma, Y.Z. Luo, and C.B. Yun (Zhejiang Univ., China), PCA-based damage detection on a revolving auditorium
- M3607-7. Y. H. Su, and X. W. Ye (Zhejiang Univ., China), Instrumentation of FBG-based monitoring system for probabilistic stress evaluation of an orthotropic steel bridge

**Poster Session (14:20~18:15)**

- P1. K.S. Choi and H.J. Kim (University of Seoul, Korea), Simplified static analysis for reinforced concrete coupled shear walls
- P2. J. Lim, J.C. Park, J. Lee (Yonsei Univ., Korea), Reliability based design optimization using statistical modeling for distribution estimation
- P3. S.Y. Lee, and J.S. Lee (Yonsei Univ., Korea), Approximate optimization of railway wheel based on thermo-mechanical analysis
- P4. S.M. Park, J.H. Lee, H.J. Ahn, and L.S. Kang (Gyeongsang National Univ., Korea), BIM-based schedule management system for railway construction project

## April 3 (Tuesday)

**SESSION T1601:** (09:00~10:30), Room 601, 6th Fl

### Performance Based Seismic Structural Design-Case Study I

**Chairman :** *Hyung-joon Kim (University of Seoul)*

- T1601-1. **(Invited Talk)** J.W. Mauk and E.Y. Lee (Korea Disaster Prevention Technology), Consideration for performance-based-seismic-design – case study part I: new apartment building
- T1601-2. J.W. Mauk and E.Y. Lee (Korea Disaster Prevention Technology), Consideration for performance-based-seismic-design – case study part II: existing building
- T1601-3. B.I. Yoon, H. Choi, and C.H. Ryu (AIMAC Structure Co. Ltd., Korea), Statistic characteristics of the earthquake resistance capacity of lowrise buildings in Korea
- T1601-4. H. Choi and B.I. Yoon (AIMAC Structure Co. Ltd., Korea), Phase characteristics of seismic acceleration records from the earthquakes of MW 5.5~6.5
- T1601-5. S.H. Nam, and D.H. Kim (Hanwool Structural Consulting Engineer, Korea), Comparison of stiffness of elastic and inelastic coupling beams
- T1601-6. T. Kim, S.H. Kim, K.H. Park, and J.H. Kim (Chang Minwoo Structural Consultants, Korea), Seismic performance of high-rise residential shear wall buildngs designed according to the prescript code
- T1601-7. D.H. Kim, and S.H. Nam (Hanwool Structural Consulting Engineer, Korea), Resistant ratios of gravity loads and lateral loads in nonlinear dynamic analysis

**SESSION T1602:** (09:00~10:30), Room 602, 6th Fl

### EDISON Structural Dynamics

**Chairman :** *S.J. Shin (Seoul National University)*

- T1602-1. **(Invited Talk)** Hyun-Gyu Kim, Y.J. Cheon (Seoul Tech, Korea), Development of a finite element program for education of solid mechanics associated with large deformations and material behaviors
- T1602-2. D.H. Gong, H.S. Cho, H.S. Joo, and S.J. Shin (Seoul National Univ., Korea), Three-dimensional nonlinear analysis by web-based co-rotational shell analysis
- T1602-3. J. Kim, G. Yun, and D.-N. Kim (Seoul National Univ., Korea), Applying the component mode synthesis to equilibrium protein dynamics
- T1602-4. J.H. Choi and B.C. Lee (KAIST, Korea), A 4-node tetrahedral element based on the modified couple stress theory
- T1602-5. A.D. Adeba, B. Choo, and Y.M. Lim (Yonsei Univ., Korea), Simulation of crtical section of rectangular RC beam to prevente nominal shear failur

**SESSION T1603:** (09:00~10:30), Room 603, 6th Fl

**Building Modeling/Management/Construction/Design BIM III**

**Chairman : H.J. Kim (University of Seoul)**

- T1603-1. **(Invited Talk)** H.J. Kim, C.Q. Jin, Y.S. Yoon, and C.T. Hyun (Univ. of Seoul, Korea), Development of IFC based duration prediction algorithm for railway construction
- T1603-2. S.U. Joo, C.K. Kim, J. Rho, S.M. Ahn (Dankook Univ., Korea), 3D modeling method for architectural finishes by referencing attribute data of finishing materials
- T1603-3. T. H. Kwon, S. I. Park, and S.-H. Lee (Yonsei Univ., Korea), Information modeling of railway track to apply data schema
- T1603-4. H. Kim (Texas A&M Univ., USA), A BIM-based daylighting performance integration for climate responsive building envelope design
- T1603-5. Claire Kim, C.K. Kim (Changsoft i&i, Korea), Pilot project for structural detail design and QTO using BIM

**SESSION T1604:** (09:00~10:30), Room 604, 6th Fl

**Computational Wind Engineering**

**Chairman : Sungsu Lee (Chungbuk National University)**

- T1604-1. **(Invited Talk)** H. J. Ham, S. H. Choi, W. Yun, S. Lee, and J. Lee (Kangwon National Univ., Korea), Assessment of volcanic ash fragility for vinyl greenhouses considering potential volcanic scenarios around the Korean peninsula
- T1604-2. J.S. Hwang, D.K. Kwon, A. Kareem (Chonnam National Univ., Korea), Damping estimation of a structure under wind load by a virtual dynamic shaker with local flatness
- T1604-3. S.H. Shin, W.B. Park, D.H. Seol, and H.J. Kim (Kyungpook National Univ., Korea), Vision-based system identification for MDOF structures
- T1604-4. M.Y. Park, H.G. Jeong, D.H. Han, S.D. Kwon (Chonbuk National Univ., Korea), Effect of high wind on onsite activities of firefighters
- T1604-5. H. Son, S. Lee, W.H. Yi (Chungbuk National Univ., Korea), Reliability ensemble estimation of volcanic ash dispersion

**SESSION T1605:** (09:00~10:30), Room 605, 6th Fl

**Understanding of material behavior under extreme conditions using atomistic simulations**

**Chairman : K.W. Kang (Yonsei University)**

- T1605-1. **(Invited Talk)** H.G. Lee, S.H. Yoo, B.C. Lee, K.W. Kang (Yonsei Univ., Korea), The free-surface effects on the cascades under the multiple-irradiations in bcc tungsten: molecular dynamics simulations
- T1605-2. M. S. Jeong, S. H. Ryu, and K.W. Kang (Yonsei Univ., Korea), Calculation of surface energy barrier of deformable body adhesion to patterned surface in Cassie-Baxter wetting mode by using numerical modeling
- T1605-3. S. Moon and K. Kang (Yonsei Univ., Korea), Dislocation transmission behavior of bi-crystal bcc tantalum with  $\sum 5$  symmetric tilt grain boundary using molecular dynamics simulation
- T1605-4. S. Yoo, B. Lee and K. Kang (Yonsei Univ., Korea), Reconstruction of tersoff potential model for mechanical properties of silicene in elastic regime
- T1605-5. Y.W. Kim and K.W. Kang (Yonsei Univ., Korea), Multiscale indentation and bending simulations of mono-layered graphene in elastic regime

**SESSION T1606:** (09:00~10:30), Room 606, 6th Fl

**Multiphysics Analysis and Experiment I**

**Chairman : Gil Ho Yoon (Hanyang University)**

- T1606-1. D.M. Park, J.H. Kim, S.J. Lee, and G.H. Yoon (Hanyang Univ., Korea), Analysis of geometrical characteristics of CNT-Al composite using molecular dynamics and the modified rule of mixture (MROM)
- T1606-2. H. B. Ahn, G. H. Yoon (Hanyang Univ., Korea), Implementation of negative stiffness structure using buckling of beam
- T1606-3. D.H. Oh, J.H. Yoon, D.M. Park, J.J. Kim, and G.H. Yoon (Hanyang Univ., Korea), Penetration experiment and analysis of non-lethal bullets using various material
- T1606-4. Hyuk. Kim, Chung-Hee. Yoon, and Gil-Ho. Yoon (Hanyang Univ., Korea), A study on the estimation method of material properties of hyperelastic structures of random shapes
- T1606-5. Hyunggyu Choi, Gil Ho Yoon (Hanyang Univ., Korea), Multi frequency vibration absorber for elastic wave

**SESSION T1607:** (09:00~10:30), *Room 607, 6th Fl*

**(Special Session) Korea Institute of Civil Engineering and Building Technology**

**Chairman : K.T. Park (Korea Institute of Civil Engineering and Building Technology)**

- T1607-1. **(Invited Talk)** D.W. Seo, K.T. Park, B.C. Kim, K.S. Jung (KICT, Korea), Investigation of the relationship between bridge cable damage and structural performance
- T1607-2. S. Lee, and K. Park (Kunsan National Univ., Korea), Microcell sensor system for monitoring of steel corrosion in marine concrete structure
- T1607-3. Y.B. Lee, M.G. Ha, S.H. Jeon, and J.H. Ahn (GNTECH, Korea), Steel durability monitoring of steel frame structure depending on structural detail
- T1607-4. B.C. Kim, K.T. Park, D.W. Seo, J.S. Park (KICT, Korea), Nonlinear dynamic analysis of stay-cable using computational fluid dynamics
- T1607-5. C. Kim, J. Kim, and N. Gucunski (Ajou Univ., Korea), Development of a nondestructive testing data processing and analysis program for predicting remaining service life of concrete bridges

**SESSION T1600A:** (09:00~10:30), *Room 600A, 6th Fl*

**CAE and Applications IV (Optimization)**

**Chairman : Heoung Jae Chun (Yonsei University), Jongsoo Lee (Yonsei University)**

- T1600A-1 T.H. Noh and H.J. Chun (Yonsei Univ., Korea), Optimized design of unicompartmental knee implant for minimal contact pressure
- T1600A-2 D.H. Cho, I.H. Baik, H.C. Choi, S.H. Jung and Y. Lee (Chung-Ang Univ., Korea), Automatic design and optimization of a drawing process based on artificial neural network and genetic algorithm
- T1600A-3 H.D. Nguyen, and G.W. Jang (Sejong Univ., Korea), Buckling topology optimization of thin-walled beam cross section using moving morphable bars

**Coffee Break (10:30~11:00)**

**Plenary Session II (11:00~12:10)**

- 4. Prof. Seiichi Koshizuka (11:00~11:35) Room # Convention hall
- 5. Prof. Xu Guo (11:35~12:10) Room # Convention hall

**Lunch (12:10~13:30)**

**SESSION T2601:** (13:30~15:00), *Room 601, 6th Fl*

**Performance Based Seismic Structural Design-Case Study II**

**Chairman :** *Hyung-joon Kim (University of Seoul)*

- T2601-1. D.H. Shin, and H.-J. Kim (University of Seoul, Korea), Site-specific response spectra of Gyeongju based on the ground motion prediction equation
- T2601-2. C.W. Moon, D.H. Shin, and H.-J. Kim (University of Seoul, Korea), Effects of constant plastic hinge rotations in a refined physical theory brace model
- T2601-3. J.M.Hong, D.H.Shin, and H.-J.Kim (University of Seoul, Korea), Nonlinear modeling of unreinforced masonry wall using the fiber and shear spring elements
- T2601-4. J.M.Hong, and H.-J.Kim (University of Seoul, Korea), Comparative study on preliminary and detailed seismic capacity evaluations of unreinforced masonry structures
- T2601-5. H.S. Jung, D.H. Shin, and H.J. Kim (University of Seoul, Korea), Finite element analysis of insulated sandwich wall panels

**SESSION T2602:** (13:30~15:00), *Room 602, 6th Fl*

**Analytical/Numerical and Experimental Approaches for CCUS**

**Chairman :** *Hammad raza Khalid (KAIST)*

- T2602-1. **(Invited Talk)** Hammad R. Khalid and H.K. Lee (KAIST, Korea), Low-carbon solid geopolymer adsorbents incorporating nano-crystalline zeolites
- T2602-2. J.H. Seo, S.M. Park, Issam T. Amr, Bandar A. Fadhel, A. Al Ehnaidi, Rami A. Bamagain and H.K. Lee (KAIST, Korea), Carbonation curing of cement blended with supplementary cementitious material (SCM): an overview
- T2602-3. Z. Wang, H.R. Khalid, and H.K. Lee (KAIST, Korea), Utilization of zeolites for CO<sub>2</sub> capture: an overview
- T2602-4. J.S. Kim, S.M. Park, and H.K. Lee (KAIST, Korea), Thermomechanical behaviors of alkali activated concrete subjected to high temperatures: an overview
- T2602-5. D.S. Morikawa, M. Asai (Kyushu University, Japan), Improvements on highly viscous fluid simulation using a particle method

**SESSION T2603:** (13:30~15:00), *Room 603, 6th Fl*

**Building Modeling/Management/Construction/Design BIM IV**

**Chairman :** *Sunghoon Kim (TAESUNG SNI)*

- T2603-1. **(Invited Talk)** S.I. Park, S.H. Park, and S.-H. Lee (Yonsei Univ., Korea), Decision

tree-based efficient XML schema matching process for structural calculation document of bridge structure

- T2603-2. S.H. Kim, C.B. Joo, J.H. Jung, and S.H. Lee (TAESUNG SNI, Korea), Virtual construction system based on BIM for infrastructure project
- T2603-3. J. Rho, H.S. Lee, M. Park, C.K. Kim (Seoul National Univ., Korea), A study on the application of BIM data in interior finishing
- T2603-4. S.U. Kim, C.K. Kim (Dankook Univ., Korea), The method of large-scale roof structural model by structural design process based on parametric system
- T2603-5. J.Y. Shin, J.S. Won, H.S. Moon and K.B. Ju (Korea Institute of Civil Engineering and Building), Extraction of the levee elements for developing the IFC schema for river facility
- T2603-6. S.J. Kim, H. Ok, T.H. Kim, and K.B. Ju (Korea Institute of Civil Engineering and Building), Conceptual design of web-based BIM viewer

**SESSION T2604:** (13:30~15:00), *Room 604, 6th Fl*

**(Special Session) Korea Expressway Corporation**

**Chairman : Jong-Sub Lee(Korea Expressway Corporation)**

- T2604-1. **(Invited Talk)** J.S. Lee, J.H. Lee, H.S. Lee, K.Y. Im, and H.T. Kang (Korea Expressway corporation), Development of automatic expressway pavement distress detection system using deep learning based image analysis
- T2604-2. B.J. Lee, I.B. Kim, J.N. Do (Korea Expressway corporation), 3D scanning & diagnosis robot (Argos)
- T2604-3. J.I.B. Kim, B.J. Lee, and C.H. Park (Korea Expressway corporation), Inspection of bridge expansion joint-gaps based on line scan image sensing
- T2604-4. J.C. Park, J.W. Choi, C.H. Park and H.T. Kang (Korea Expressway corporation), Vision based monitoring and evaluation of stay cables on a cable-stayed bridge
- T2604-5. C.G. Lee, W.T. Lee, S.H. Kim, and J.J. Lee (Sejong university), Evaluation of load carrying capacity for bridges using model updating techniques

**SESSION T2605:** (13:30~15:00), *Room 605, 6th Fl*

**Resilience Analysis and Optimization for Materials and Structures**

**Chairman : Jung-Wuk Hong(KAIST), Ik Jin Lee(KAIST)**

- T2605-1. **(Invited Talk)** Z.Y. Duan, I.J. Lee, J. Yan, and J.Y. Wang (KAIST., Korea), Concurrent multi-scale design optimization of composite frames for maximum fundamental frequency with manufacturing constraints

- T2605-2. A. Azad, K.J. Lee, J.J. Lee, Y.K. An, and J.H. Lee (Daegu Univ., Korea), Evaluating effects of fresh SFRSCC's density and flow velocity on fiber alignment using finite element method
- T2605-3. S. Jin, S.Y. Lee, and J.W. Hong (KAIST, Korea), Effect of excitation frequencies on nonlinear wave modulation
- T2605-4. H.W. Jang, K. Ko, and J.W. Hong (KAIST, Korea), Development of patterned composite materials for enhanced energy absorption
- T2605-5. K.H. Kang, I.J. Lee (KAIST, Korea), Accuracy improvement of high dimensional surrogate model using decomposition and virtual samples
- T2605-6. D. Gu, H. Kim, and H.Y. Kim (Texas A&M Univ., USA), Use of satellite based thermal images to validate urban climate simulation

**SESSION T2606:** (13:30~15:00), *Room 606, 6th Fl*

**Multiphysics Analysis and Experiment II**

**Chairman : Gil Ho Yoon (Hanyang University)**

- T2606-1. J.W. Kim, J.S. Choi, and G.H. Yoon (Hanyang Univ., Korea), Resonance frequency of cone-shaped heterogeneous double split hollow sphere (CSHDSHS)
- T2606-2. S.I. Ha, H.G. Choi, G.H. Yoon (Hanyang Univ., Korea), Vibration absorber model design to avoid thin beam's 2nd and 3rd resonance
- T2606-3. H.D. Gil, D.H. Oh, G.H. Yoon (Hanyang Univ., Korea), Development and verification of split Hopkinson pressure bar (SHPB) apparatus for dynamic property measurement of elastic metamaterials using elastic wave theory
- T2606-4. J.S. Choi, G.H. Yoon (Hanyang Univ., Korea), Realization of broadband absorbing acoustic metamaterials with combined heterogeneous double split hollow sphere (CHDSHS)

**SESSION T2607:** (13:30~15:00), *Room 607, 6th Fl*

**(Special Session) Korea Infrastructure Safety Corporation**

**Chairman : Kim, Dongjoo (KISTEC, Facility Research Institute)**

- T2607-1. **(Invited Talk)** J.B. Park, H.S. Choi, J.H. Ahn, and K.S. Park (KISTEC, Korea), Development of seismic damage prediction system for bridge structures
- T2607-2. J.E. Seo, J.H. Seong, M.H. Jung, and B.I. Choi (KISTEC, Korea), Development of restoration manual for road sink
- T2607-3. D.K. Lee, D.W. You, S.W. Park, and C.S. Shim (KISTEC, Korea), Introduction of BIM-based maintenance system for a cable-stayed bridge
- T2607-4. S.H. Lee, S.W. Park and G. Choi (KISTEC, Korea), Study on the seismic response

characteristics of cable-supported bridges on service due to the recent earthquakes in Korea

T2607-5. C.H. Shin, D.Y. Ryu, T.Y. Noh, and S.H. Jung (KISTEC, Korea), An analysis and retrofit of fatigue cracks due to stress concentration of steel structure

T2607-6. S.H. Choi, and J.S. Lee (National Disaster Management Research Institute), Tweet analysis on the earthquake occurred in Pohang

**SESSION T2600A:** (13:30~15:00), *Room 600A, 6th Fl*

**Machine Learning / Deep Learning**

***Chairman : Jong-Jae Lee (Sejong University)***

T2600A-1. H. Kim, E. Ahn, M. Shin, and S.-H. Sim (UNIST, Korea), Concrete crack identification in the presence of noncrack objects using machine learning

T2600A-2. M.Y. Jeon, J.H. Lim, O.K. Lim, and Y.J. Noh (Pusan National Univ., Korea), Big data analysis for ship performance prediction

T2600A-3. S. Cho, B. Kim, and Y.-I. Lee (University of Seoul, Korea), Real-time image-based damage search at concrete structures using deep learning

T2600A-4. K.Y. Jang and Y.K. An (Sejong Univ., Korea), Autonomous concrete crack detection using a hybrid image scanning system

T2600A-5. N.G. Kim and J.J. Lee (Sejong Univ., Korea), Underground object mapping on urban roads using deep learning technique

T2600A-6. E. Ibragimov, N.G. Kim, J.J. Lee, and J.K. Song (Sejong Univ., Korea), Pavement condition evaluation using deep learning and image processing techniquesng system

**Short Break (15:00~15:10)**

**Semi-Plenary Session II (15:10~16:00)**

3. Prof. Mitsuteru Asai (15:10~15:35) Room #600A

4. Prof. MaengHyo Cho (15:10~15:35) Room #600B

5. Prof. SangHo Lee (15:35~16:00) Room #600A

6. Prof. CheeKyeong Kim (15:35~16:00) Room #600B

**POSTER SESSION :** (10:30~15:00), *6th Fl Lounge*

**General Poster Session**

P5. S.H. Kim, K.S. Kim, O. Han, and M. Gombosuren (Yonsei Univ., Korea), Behavior of Y-type perfobond rib shear connectors for various transverse rebars

- P6. D.Y. Kang, M.K. Kim (Yonsei Univ., Korea), Flexural behavior of spiral pipe with residual stresses
- P7. H.C. Jo, J.H. Kim, K.W. Lee, and Y.M. Lim (Yonsei Univ., Korea), Non-contact strain estimation method of a shell structure based on 3D coordinates information from terrestrial lidar
- P8. Hyun Su Moon, Su Yeol Ok, and Yun Mook Lim (Yonsei Univ., Korea), Artificial neural network aided dynamic displacements prediction of girder bridge subjected to moving vehicle

### **Special Poster Session**

#### **CAE and Applications (Materials and Energy)**

- P9. Y.C. Jeong, D.Y. Jeong, T.H. Noh and H.J. Chun (Yonsei Univ., Korea), A study on the morphological variations of lumbar spine using statistical and principal component analysis
- P10. S.H. Kim, O. Han, J.G. Choi, K.S. Kim, and J. Shin (Yonsei Univ., Korea), Behavior of Y-type perfobond rib shear connection under cyclic loading
- P11. W. Lee and D. Kim (Sogang Univ., Korea), Effect of lattice coherency on the morphology of microstructures in metal alloy: a phase field approach
- P12. J. Kim, H. Choi, D. Kim (Sogang Univ., Korea), Development of simplified connector model for flow drill screw in dissimilar materials
- P13. Chan-Woo Joung, Young-Bin Park (UNIST, Korea), Design of fiber-reinforced composite laminate considering manufacturing constraints
- P14. In Yong Lee, Young Bin Park (UNIST, Korea), A feasibility study on CNT- and graphene-aided structural health monitoring of wind turbine blades
- P15. J.C. Kim, S.H. Oh (pusan national univ., Korea), Analytical study on seismic wave characteristics and seismic damage of Pohang earthquake
- P24. H.S. Kang, B.J. Pak, H.J. Chun, J.C. Park, and H.S. Jang (Yonsei Univ., Korea), A research on characteristic length of clamping force in double bolted composite material

#### **Coffee Break (16:00~16:30)**

#### **Free Time (16:30~18:30)**

#### **Banquet (18:30~20:30)**

## April 4 (Wednesday)

**SESSION W1601:** (09:00~10:30), Room 601, 6th Fl

### Smart Materials and Structures

**Chairman :** Heung Soo Kim (Dongguk University), Il-Kown Oh (KAIST)

- W1601-1. **(Invited Talk)** A.Khan, H.S Kim (Dongguk Univ., Korea), Data mining techniques for structural damage classification in smart composite laminates
- W1601-2. S. Msolli, C. Labergere, M. Martiny, M. Francois, H.S. Kim, and F. Choquart (Dongguk Univ., Korea), Mechanical behavior of embossed aluminium sheets subjected to different loadings
- W1601-3. J.S. Oh, J.M. Park, and J.W. Sohn (Kumoh National Institute of Technology), Semi-active control of vehicle anti-roll bar
- W1601-4. H.T.Le, P.Thammarak (Asian Institute of Technology), Structural health monitoring of reinforced concrete column by normalized modal strain approach

**SESSION W1602:** (09:00~10:30), Room 602, 6th Fl

### Linking the Materials Properties with Computational Science I

**Chairman :** Jae Hong Kim (UNIST), Hyeong-Ki Kim (Chosun University)

- W1602-1. **(Invited Talk)** S.H. Han, J.H. Kim (UNIST, Korea), Evaluating the rheological properties of mortar under a high pressure using the Sisko model
- W1602-2. T. Kim, M. T. Ley, J. M. Davis, and S. Kang (University of New South Wales), Developing new classification of fly ash using particle analysis
- W1602-3. B.I. Choi, and J.H. Kim (UNIST, Korea), Methodology of cement pastes analyzing using viscosity curve
- W1602-4. J.Y. Yoon, B.I. Choi, T.Y. Shin, and J.H. Kim (UNIST, Korea), Rheological properties of cement paste with different types of PCE
- W1602-5. M. Tafesse, M.J. Lim, H.K. Lee, and H.K. Kim (Chosun Univ., Korea), Crack detection and modeling of a CNT/cement composite based on conductivity

**SESSION W1603:** (09:00~10:30), Room 603, 6th Fl

### Computational Fluid Dynamics and Its Mathematical Approach

**Chairman :** Chohong Min (Ewha Womans University)

- W1603-1. **(Invited Talk)** C. Min (Ewha womans Univ., Korea), Numerical analysis for fluid-solid interaction

- W1603-2. H. Yang and J. Yoon (Ewha womans univ., Korea), Construction of a nonlinear approximation scheme for piecewise smooth data
- W1603-3. H.W. Park, J.-I. Choi, C. Lee, and T.S. Park (Yonsei Univ., Korea), An immersed boundary formulation with two layer based turbulent wall model for RANS simulation
- W1603-4. J. Shin, H. G. Lee, and J.-Y. Lee (Ewha Womans Univ., Korea), High order and energy stable numerical methods for the phase field equations
- W1603-5. H.S. Joo, I. Jang, S.H. Kang, S.-J. Shin, W. Ohm, and J.W. Park (Seoul National Univ., Korea), Numerical prediction on jet aeroacoustics for an experimental scale rocket nozzle

**SESSION W1604:** (09:00~10:30), *Room 604, 6th Fl*

**Building Structure Health Monitoring I**

**Chairman :** *S.W. Choi (Daegu Catholic University)*

- W1604-1. D.Y.Yun, H.S.Park (Yonsei Univ, Korea), Structural system identification using genetic algorithm and Kalman filter
- W1604-2. I.S. Choi, J.H. Kim (Yonsei Univ., Korea), The Hualien earthquake of February 06, 2018: field investigation of damaged structure
- W1604-3. H.J.Jang, J.H. Kim (Yonsei Univ., Korea), Successive seismic performance assessment considering structure damaged by mainshock
- W1604-4. S.W.Choi (Catholic Univ., Korea), Optimal seismic design method for minimizing costs and carbon dioxide emissions in reinforced concrete moment frames
- W1604-5. Y.S.Kim, H.S.Park (Hongik Univ., Korea), Evaluation of deformed shape of reinforced concrete members by using motion capture cameras

**SESSION W1605:** (09:00~10:30), *Room 605, 6th Fl*

**Simulation & Energy Materials**

**Chairman :** *Joong-Hee Lee (Chonbuk National University),*

*Heoung-Jae Chun (Yonsei University)*

- W1605-1. **(Invited Talk)** J. Balamurugan, T. T. Nguyen, B. Ravichandra, N. H. Kim, J. H. Lee (Anna Univ., India), Metal-organic framework derived manganese nickel phosphide nanosheet arrays for flexible high-energy supercapacitors
- W1605-2. Parthasarathi Bandyopadhyay, Xuyang Li, Chao Li, Nam Hoon Kim, and Joong Hee Lee (Indian Institute of Technology), Facile synthesis of nickel–aluminum layered double hydroxide/functionalized graphitic carbon nitride doped

- reduced graphene oxide for asymmetric supercapacitor application
- W1605-3. Soram Bobby Singh, Tolendra Kshetri, Thangjam Ibomcha Singh (Manipur Univ. India), Embedded PEDOT:PSS/AgNFs network hybrid transparent supercapacitor electrode for symmetric solid-state flexible supercapacitor
- W1605-4. G. Rajeshkhanna, C. Li, M. S. Yoon, N. H. Kim, and J. H. Lee (Indian Institute of Technology Madras), Nanostructured iron based Oxy hydroxides: for electrochemical oxygen evolution reaction
- W1605-5. K. Sharma, M. Kakali, G. Saeed, N. H. Kim, J. H. Lee (Guru Nanak Dev Univ., India), An electrocatalyst of Co-Mo-N nanostructures stabilized N-doped graphene for oxygen reduction reaction
- W1605-6. Tran Duy Thanh, Hoa Van Hien, Le Huu Tuan, Nam Hoon Kim, Joong Hee Lee (Viet Nam National Univ., Vietnam), Cu-Au NPs functionalized CNTs vertically grown on carbon spheres as an effective platform for detecting cancer biomarker

**SESSION W1606:** (09:00~10:30), *Room 606, 6th Fl*

**Reduced Order Modeling in Engineering Analysis and Design Problems**

**Chairman : Maenghyo Cho (Seoul National University)**

- W1606-1. **(Invited Talk)** Jaehun Lee (Kyungnam Univ., Korea), Parametric reduced-order models using dynamic substructuring schemes
- W1606-2. S. Im, J. Lee, and M. Cho (Seoul National Univ., Korea), A coupling method for non-matching interfaces using moving least square approximation
- W1606-3. H. Kim, E. Kim, W. Kim, and M. Cho (Seoul National Univ., Korea), Application of proper orthogonal decomposition to 2D plane element model using absolute nodal coordinate formulation
- W1606-4. J. Lee and M. Cho (Seoul National Univ., Korea), Non-intrusive reduced order modeling based on POD/RBF interpolation and fast fourier transform for Navier-Stokes model
- W1606-5. J.H. Lee and J.H. Kim (UNIST, Korea), Evaluating the performance of high-range water-reducing admixtrues with a wet-sieved mortar

**SESSION W1607:** (09:00~10:30), *Room 607, 6th Fl*

**Climate Change and Urban Disaster Prevention I**

**(GIT4CC-KRIHS-PNU(GSCC)-APCC)**

**Chairman : B.J. Lee (Korea Research Institute for Human Settlements),**

**S.S. Jeong (Yonsei University)**

- W1607-1. **(Invited Talk)** J. Lee, S. Lee, and S. Kim (KRIHS), Development of urban flood risk maps for strengthening urban planning toward disaster prevention by climate change
- W1607-2. S.K. Yoon, J.P. Cho, and Y.I. Moon (APEC Climate Center), The recent increasing trend of extreme rainfall and its future projection over the Korean peninsula
- W1607-3. H.J. Park, J.C. Jung (Pusan National University, Korea), A national plan can matter natural hazard mitigation plan in South Korea
- W1607-4. B.J. Lee and S.Y. Kim (KRIHS), Climate change and disaster preventive urban planning in Korea
- W1607-5. S.S. Lee, K.Y. Park (APEC Climate Center), Development of urban inundation analysis tool based on remote sensing technique
- W1607-6. S.M. Jun, D.O. Ha, P.S. Jung, and J.C. Jung (Pusan National Univ., Korea), Virtual simulation as a tool for public participation in natural disaster prevention by climate change

### **Short Break (10:30~10:40)**

### **Semi-Plenary Session III (10:40~11:05)**

7. Prof. H. K. Lee (10:40~11:05) Room #600A
8. Prof. HeungJae Chun (10:40~11:05) Room #600B

### **Coffee Break (11:05~11:30)**

**SESSION W2601:** (11:30~13:00), *Room 601, 6th Fl*

### **Computational Methods in Structural Dynamics II**

**Chairman :** *Sang Lyul Cha (KAIST), In-Ho Kim (KAIST)*

- W2601-1. **(Invited Talk)** I.H. Kim, H.M. Jeon, and H.J. Jung (KAIST, Korea), A study on transfer learning for crack detection and localization of civil infrastructures
- W2601-2. J.H Lee, S.S.Yoon, I.H.Kim, and H.J.Jung (KAIST, Korea), A feasibility study of FOV selection for bridge crack identification and quantification using unmanned aerial vehicle (UAV)
- W2601-3. S.S. Yoon, H.J. Jung (KAIST, Korea), Seismic reliability analysis of urban water distribution network
- W2601-4. S.L. Cha, J.C. Park and S.S. Jin (KAIST, Korea), Estimation approach of concrete properties for the design of mass concrete structures

W2601-5. S.S. Jin, H.K. Ju, and S.Y. Cha (KAIST, Korea), Bayesian inference using generalized likelihood for non-traditional residuals

**SESSION W2602:** (11:30~13:00), *Room 602, 6th Fl*

**Linking the Materials Properties with Computational Science II**

**Chairman :** *Jae Hong Kim (UNIST), Hyeong-Ki Kim (Chosun University)*

W2602-1. **(Invited Talk)** S. Y. Abate and H.K. Kim (Chosun Univ., Korea), A study on the hydration of sodium silicate based alkali activated slag

W2602-2. T.Y. Shin and J.H. Kim (UNIST, Korea), Prediction of concrete flow in congested reinforcement

W2602-3. Y. Li, X. Ruan, Z. Jin (Tongji Univ., China), The numerical simulation of concrete chloride ingress on the multiscale transition zone

W2602-4. S. Y. Abate and H.K. Kim (S. Y. Abate and H.K. Kim, Korea), Autogenous shrinkage model of sodium silicate based alkali activated slag

W2602-5. HaeMin Jeon and B.J. Yang (Korea Institute of Science and Technology, Korea), An application of firefly algorithm to micromechanics for automated identification of model parameters

**SESSION W2603:** (11:30~13:00), *Room 603, 6th Fl*

**CAE and Applications V (Material Behavior and Numerical Analysis)**

**Chairman :** *Heoung Jae Chun (Yonsei University), Kenji Yasuoka (Keio University)*

W2603-1. **(Invited Talk)** Y.J. Kang, Y. Noh, and O.K. Lim (Pusan National Univ., Korea), Advanced nonparametric statistical modeling method for insufficient correlated data

W2603-2. K. Morita, T. Shibuya, and K. Yasuoka (Keio Univ., Japan), Density functional theory study of excess electrons in reduced rutile TiO<sub>2</sub> surfaces

W2603-3. D.T. Ho, V.H. Ho, H.S. Park, and S.Y. Kim (UNIST, Korea), An atomistic study on the non-reciprocal behavior of a graphene meta-structure

W2603-4. B.Bagheri, S.H. Oh, and S.H. Shin (Pusan National Univ., Korea), Plastic strain energy prediction of hysteretic dampers according to optimum yield strength in coupled shear wall buildings

W2603-5. S.H. Shin, S.H. Oh, B. Bagheri (Pusan National Univ., Korea), Seismic design procedure for passive control structure based on energy-based design

**SESSION W2604:** (11:30~13:00), *Room 604, 6th Fl*

**Building Structure Health Monitoring II**

**Chairman :** *H.B.Shim (LOTTE E&C)*

- W2604-1. H.B.Shim, T.W.Byeon, W.K.Seok, S.J.Park (LOTTE E&C, Korea), A study on the applicability of three-dimensional laser scanning system for the evaluation of deformation measurement during construction in basement structure
- W2604-2. H.B.Shim, W.K.Seok, S.J.Park (LOTTE E&C, Korea), Deflection and crack analysis of long span flat plate structure affected by construction load
- W2604-3. Ji-Young Kim, Jae-Keun park (DAEWOO E&C, Korea), Evaluations of wind-induced responses using pressure integration method
- W2604-4. S.W.Park, J.M.Kim, H.S.Park (Yonsei University, Korea), A proposal on vibration measuring system to detect underground cavity
- W2604-5. H.S.Lee, S.W.Yang, H.S.Park (Yonsei University, Korea), Estimation of structural behavior using artifucual neural network

**SESSION W2605:** (11:30~13:00), *Room 605, 6th Fl*

**(Special Session) Coastal and Ocean Space Utilization (KIOST)**

**Chairman :** *W.S. Park(KIOST), Jin-Hak Yi(KIOST)*

- W2605-1. **(Invited Talk)** J.-H. Yi, S.B. Kim, G.L.Yoon, K.T.Bae (KIOST, Korea), Reliability analysis for suction bucket and gravity-based foundations for offshore wind turbines
- W2605-2. H.M. Hong, S.W. Kim, and T.H.Han (KIOST, Korea), Bending performance test of FRP-DSCT wind turbine tower
- W2605-3. B.W. Lee, W.S. Park, S.H.Oh, D.Won, and J.Seo (KIOST, Korea), A study of long structures by using interlocking method
- W2605-4. J.H. Seo, D.H. Won, and W.S. Park (KIOST, Korea), Bahavior of inter-cell for open-cell caisson breakwater system
- W2605-5. B. Won and M.O. Kim (KIOST, Korea), Shear capacity of reinforced lightweight concrete beams: experimental and numerical study
- W2605-6. D.H. Won, J.H. Seo, I.S. Jang (KIOST, Korea), Study on working days for underwater construction with underwater construction robot
- W2605-7. D.H. Ko, J.S. Park, J.H. Yi, and K.S. Lee (KIOST, Korea), A master plan for the establishment of sea test bed for tidal current energy converters in Korea

**SESSION W2606:** (11:30~13:00), *Room 606, 6th Fl*

**Multiscale Analysis in Complex Materials and Structures**

**Chairman :** *Maenghyo Cho (Seoul National University)*

- W2606-1. **(Invited Talk)** Seunghwa Yang (Chung-Ang Univ., Korea), A two step multiscale modeling of carbon nanotube/carbon fiber/polymer hybrid nanocomposites
- W2606-2. I.Chung, J.Han, H.Kim, B.Kim, J.J. Kim, Y.J. Kim, S.G. Lee, K.H. Won and M.Cho (Seoul National Univ., Korea), Multiscale approach for the construction of cohesive zone model on the interface of C/SiO<sub>2</sub> layer
- W2606-3. T.S.Hwang and M.H Cho (Seoul National Univ., Korea), First-principles calculation on the mechanism of graphite oxide anode for sodium-ion battery
- W2606-4. S.K. Yi, K.Cho, and M. Cho (Seoul National Univ., Korea), Potassium doped silicate cathode materials for rechargeable Li-ion batteries from Ab-initio study to improve performance
- W2606-5. S.W. Park, J. Moon, B. Kim and M. Cho (Seoul National Univ., Korea), Coarse-grained molecular dynamics simulation of shape-memory behavior of segmented polyurethane copolymer
- W2606-6. Y.S. Hwang, H. Lee, and M. Cho (Seoul National Univ., Korea), Sensitivity of bistable symmetric laminates to design/environmental variables

**SESSION W2607:** (11:30~13:00), *Room 607, 6th Fl*

**Climate Change and Urban Disaster Prevention II**

**(GIT4CC-KRIHS-PNU(GSCC)-APCC)**

**Chairman :** *B.J. Lee (Korea Research Institute for Human Settlements),*

*S.S. Jeong (Yonsei University)*

- W2607-1. **(Invited Talk)** T.K. Kim, D.H. Yang, H.B. Lee, and J.H.J. Kim (Yonsei Univ., Korea), Freeze-thaw resistance evaluation of concrete cured under various conditions due to climate change effect
- W2607-2. Y.H. Jang, S.I. Park, S. H. Lee (Yonsei Univ., Korea), Development of flood damage assessment technique using 3D city information model
- W2607-3. H.J. Seo, H.Y. Jeong, I.C. Kim, J.H. Lee and H.K. Kim (Yonsei Univ., Korea), Evaluation of stability change for shallow foundation under climate change
- W2607-4. M.H. Hong, J.H. Kim, S.H. Jeong, and S.S. Jeong (Yonsei Univ., Korea), A study on regional scale landslide predictions with probabilistic rainfall thresholds and physical model
- W2607-5. J.Y. Heo, D.H. Nguyen, D.H. Bae (Sejong Univ., Korea), Integrated hydrological modeling in urban areas based on climate change: case study for the Jungnang river watershed

W2607-6. D.H. Nguyen, S.S.Yoon, D.H. Bae (Sejong Univ., Korea), Correcting QPF data from now-casting system for urban flood management