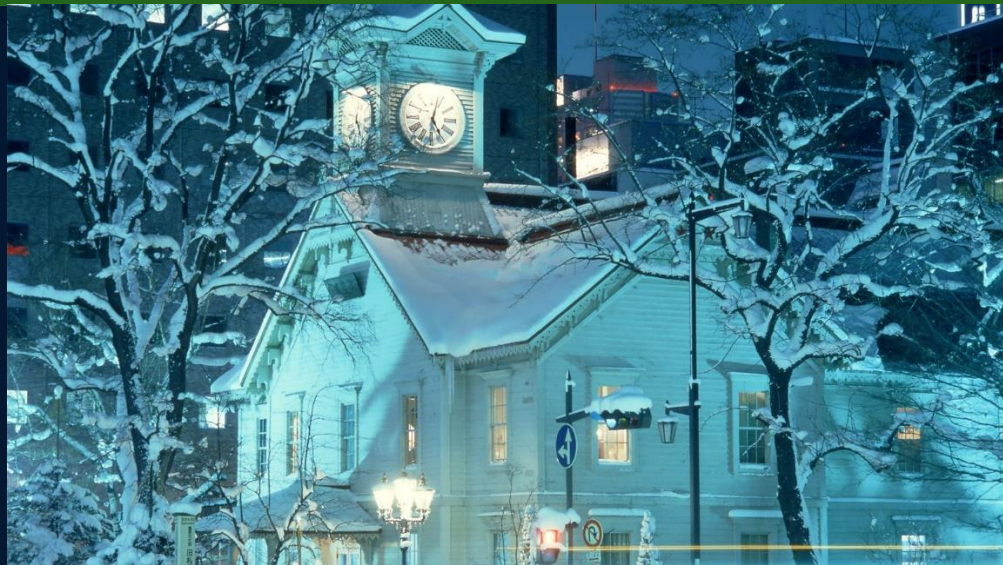


ISEV2024

ISSMGE & JGS TC202

9th International Symposium on Environmental Vibration and Transportation Geodynamics

Under the auspices of ISSMGE-TC202 Transportation Geotechnics



Organizers: TC202 National Committee of Japanese Geotechnical Society

Sponsors: Japanese Geotechnical Society

Supporters: ISSMGE-TC202 (Transportation Geotechnics)
Division of Civil Engineering, Hokkaido University

6-8 March 2024

Sapporo, Japan

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Welcome

Welcome to the 9th International Symposium on Environmental Vibration and Transportation Geodynamics, Sapporo, Japan. Thank you very much for coming - we extend our warmest regards to you.

The 9th International Symposium on Environmental Vibration and Transportation Geodynamics (formerly named as the International Symposium on Environmental Vibration) will be held at the Hokkaido University (HU) located in Sapporo, Japan on March 6-8, 2024. The first ISEV symposium was initiated by H. Takemiya of Okayama University, Japan and Yunmin Chen of Zhejiang University, China, and held in Zhejiang University, Hangzhou, China in 2003. The subsequent seven symposia were successfully convened in Okayama University, Japan (2005), National Taiwan University, Chinese Taipei (2007), Beijing Jiaotong University, China (2009), Southwest Jiaotong University, China (2011), Tongji University, China (2013), Zhejiang University, China (2016), and Central South University, China (2018), respectively. With the increasing impact over academia and industry, the symposia have attracted much attention from government officials, scientific and research communities, and engineering professionals. Geotechnical challenges associated with dynamic loads on railroad track and road pavements often require scientific and technological breakthroughs for design innovations. To effectively reflect such frontiers, this symposium was renamed as “International Symposium on Environmental Vibration and Transportation Geodynamics” in 2016 and held under the auspices of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee (TC) 202 Transportation Geotechnics.

The 9th International Symposium on Environmental Vibration and Transportation Geodynamics 2024 (ISEV 2024) is being organized by the local organizing committee composed of the TC202 national committee members of the Japanese Geotechnical Society (JGS), in association with the international technical committee ISSMGE-TC202 “Transportation Geotechnics.” The scope of the ISEV 2024 continues to cover environmental vibrations induced by industrial, civilian and transportation activities, problems associated with dynamic vehicular loading on road foundations, and sustainability challenges of transportation infrastructures and the built environment. The symposium will consist of keynote/invited lecture sessions and general sessions as well as welcome reception and conference dinner. The ISEV 2024 event will serve as a platform for academic exploration, experience exchange, and thought inspiration amongst the practitioners engaged in management, design and construction of large-scale civil and transportation infrastructure, researchers, academics and students, in liaison with “ISSMGE-TC101 Laboratory Stress Strain Strength Testing of Geomaterials (Laboratory Testing)” and “ISSMGE-TC214 Foundation Engineering for Difficult Soft Soil

Conditions (Soft Soils).” Engineers from planning, design construction and management engineering companies, decision makers, transport infrastructures managers and owners, and governmental bodies are especially encouraged to attend this symposium.

Along with the conference, please enjoy the winter of Sapporo. Sapporo is Japan's 5th largest city with a population of 2.0 million, and the prefectural capital of Hokkaido, northern island of Japan. Despite being a large metropolis, a short trip out to the suburbs reveals abundant natural scenery, where outdoor leisure activities such as hiking, canoeing, camping, and winter sport can be enjoyed. Each of the four seasons bring their own delights, and every year many tourists from both home and abroad visit the region, which is famous for being one of Japan's leading producers of delicious foodstuff. The city also ranks number two among the places Japanese people would like to live. Hokkaido University is a leading comprehensive university started out in 1876, and during its long history, the college was promoted to an Imperial University and then flourished followed by being ahead as one of the National University Corporation.

We look forward to the excellent presentations, the constructive debates and wonderful opportunity to meet socially. It is our earnest hope that all the participants share an interesting and successful conference and a comfortable and enjoyable stay in Sapporo, and that our short but significant meeting serves for participants as many as possible, especially both young researchers and students, to enhance their interests in the Environmental Vibration & Transportation Geodynamics and broaden their perspectives.

We wish you a fruitful and unforgettable ISEV 2024 symposium.



Tatsuya Ishikawa

Chair of the 9th ISEV 2024 Conference



Erol Tutumluer

Co-Chair of the 9th ISEV 2024 Conference

Committees

International Scientific Committee

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Jong-Sub Lee	Korea University, South Korea
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Andreas Loizos	National Technical University of Athens, Greece
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Yoshitsugu Momoya	Railway Technical Research Institute, Japan
Soheil Nazarian	University of Texas at El Paso, USA
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Takashi Okayasu	Kyushu University, Japan
Jin Y Ooi	The University of Edinburgh, UK
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William Powrie	University of Southampton, UK
Anand Puppala	University of Texas at Arlington, USA
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Tawatchai Tanchaisawat	Chiang Mai University, Thailand
Hao Wang	Rutgers University, USA
Mike Winter	Winter Associates Limited, UK
Yuanjie Xiao	Central South University, China
Weiping Xie	Wuhan University of Technology, China
Youlin Xu	The Hong Kong Polytechnic University, Hong Kong
Judy Yang	National Yang Ming Chiao Tung University, Chinese Taipei
Jun Yang	The University of Hong Kong, Hong Kong
Jian-Hua Yin	The Hong Kong Polytechnic University, China
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Local Organizing Committee

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Shigeki Takahashi Kanazawa Institute of Technology, Japan
Yasushi Takeuchi Tokyo University of Agriculture, Japan
Tetsuya Tokoro Hokkai-Gakuen University, Japan
Kohichi Yamanaka Nihon University, Japan

Symposium Topics

The symposium will primarily include aspects of transportation geotechnics focusing on railways, roads, and airfields. Topics will include but not limited to the following:

- Dynamic interaction of vehicle and transportation infrastructure (road and airfield pavements and track structures for rail and transit, and bridges)
- Soil-structure dynamic interaction problems in transportation
- Wave propagation and monitoring, evaluation and control of traffic induced structural and ground vibrations
- Cyclic deformation of soils and transportation foundation settlement
- Dynamic characteristics of soils and transportation infrastructure
- Analyses and testing of environmental vibrations induced by vehicle, machine and human
- Environmental vibration issues in urban subway and metro lines
- Structural safety and serviceability of transportation infrastructure
- Advances in geomaterial characterization, laboratory and field evaluation, and full scale testing
- Monitoring, evaluation and control of traffic induced vibrations of roads, railways and airfields
- Application of geosynthetics in transportation infrastructure
- Stabilization/reinforcement of foundation geomaterials of transportation infrastructure
- Climatic change effects on performance of foundation geomaterials in transportation infrastructure (road, airfield, railway and transit).

Conference Proceedings

- All the full-length papers accepted after a rigorous peer-review process will be included in the conference proceedings published from Springer Nature to be indexed by Scopus and EI Compendex.
- In parallel with the ISEV 2024 event, the Elsevier journal of Transportation Engineering is publishing full-length and keynote/invited speech papers submitted under symposium themes in a Special Issue on “Geomaterials and transportation structures under dynamic and environmental loads. “Transportation Engineering” is a Gold Open Access journal which aims to publish full papers in forefront areas of engineering related to vehicles & systems infrastructure, vehicle-based interconnectivity technology & and integration aspects (linking of vehicles to their physical surroundings). It is currently indexed by DOAJ, Scopus, and SCImago Journal Rank (SJR) - ranked in 2022, Q1, Civil and Structural Engineering; Safety; Risk, Reliability and Quality; Mechanical Engineering; Automotive Engineering; Aerospace Engineering.

Keynote/Invited Speeches

Keynote Speakers

Professor António Gomes Correia

Emeritus Professor at the Department of Civil Engineering/ Institute for Sustainability and Innovation in Structural Engineering (ISISE)

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BIOGRAPHY: António Gomes Correia is Emeritus Professor at the Department of Civil Engineering and integrated member at Institute for Sustainability and Innovation in Structural Engineering (ISISE) of University of Minho, Honorary President of the Portuguese Geotechnical Society, Vice president of the International Society for Intelligent Construction (ISIC), Elected member Board of Directors of “Université Gustave Eiffel”, Executive member of Technical Committee of ISSMGE for Transportation Geotechnics (TC202) and member of TRB committees AKG20 and AKG50. He received the diplome in Civil Engineering from the Technical University of Lisbon - IST in 1977, the degree of Doctor-Engineer Degree by “Ecole Nationale des Ponts et Chaussées”- Paris in 1985, the PhD degree in Civil Engineering by the Technical University of Lisbon – IST in 1987, and later in 1998 the title of “Habilitation” in Civil Engineering, as well as in 1987 the degree of “Especialista” by the National Laboratory for Civil Engineering (LNEC). His activities involve research, teaching and consulting in the general field of geotechnical engineering, particularly in transportation geotechnics, for 45 years. He has over 500 technical papers published on these subjects. He deliver the 2nd Proctor Lecture (Seoul, 2017), the TC202-ISSMGE Honour Lecture, and the XXXIII Manuel Rocha Lecture (Lisbon, 2016) awarded by SPG & AGAA-UNL. He has been a member of the organising/technical committees for many well established international conferences. He has founded the conference series on Transportation Geotechnics (TC 202 – ISSMGE) and organised the 3rd ICTG in Guimarães in 2016. Associated with this conference he launched the First meeting/Forum of Young Transportation Geotechnics Engineers. He has also been one of founding Editor-in-Chief for the international journal "Transportation Geotechnics" (from 2014), as well as co-Editor-in-Chief for “Transportation Engineering” (from 2020), both

published by Elsevier. He is also Editor-in-Chief of the Journal "Geotecnia" (SPG (Portugal), ABMS (Brazil), SEMSIG (Spain)) published by Impactum.

Experimental and computational model for determining shear modulus of geomaterials by bender element testing and prospects for field evaluation of the stiffness of granular layers

ABSTRACT: A national research project CEN-DynaGeo (2018-22) was carried out to enhance the accuracy and reliability of the shear modulus determination of geomaterials using experimental bender element (BE) testing coupled with numerical model. Notably, the computational model explores the use of hybrid-Trefftz finite elements to simulate and optimize BE laboratory test setups and help in interpreting output signals automatically minimizing the influence of compression waves. Experimental BE tests were conducted, including a new modified Rowe cell apparatus, with different types of sand under several test conditions to evaluate the precision, reproducibility, and robustness of bender element measurements. In addition, damping moulds manufactured by 3D printing, were designed based on computational simulations of the transient dynamics of the wave propagation, to endorse an output signal that presents a clearly identifiable arrival of the shear wave. Based in the successful results of this project a novel user-friendly computational platform GeoHyTE is available for the automatic interpretation of bender element experiments. Furthermore, a new national project INTENT (2023-25) is ongoing with field application of BE and other sensors installed in a pavement granular layer to assess the damage to the layer in real time using machine learning algorithms. This presentation will summarise the main results and elaborate about the ongoing project and its contribution to the structural health monitoring of pavement granular layers using automated operational analysis.

Professor Yeong-Bin Yang

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BIOGRAPHY: Dr. Yeong-Bin Yang received his Ph.D. degree from Cornell University in 1984. He is member of Chinese Academy of Engineering (2009), foreign member of Austrian Academy of Sciences (2007), and member of EU Academy of Sciences (2018). Currently, he is Honorary Dean of Civil Engineering, Chongqing University, and Professor Emeritus of National Taiwan University (NTU). Also, he is fellow of American Society of Civil Engineers (ASCE) and International Association of Computation Mechanics (IACM), and Editor-in-Chief of International Journal of Structural Stability and

Dynamics (IJSSD). In addition, he is President of Asian-Pacific Association of Computational Mechanics (APACM) and Chairman of International Steering Committee of East Asia-Pacific Conference on Structural Engineering and Construction (EASEC). Previously, he was President of National Yunlin University of Science and Technology (YunTech), Dean of College of Engineering, NTU, Chairman of Civil Engineering Department, NTU, and President of four societies in Taiwan: Institute of Engineering Education Taiwan (IEET), Chinese Institute of Civil and Hydraulic Engineering (CICHE), Society of Theoretical and Applied Mechanics (STAM), and Chinese Society of Structural Engineering (CSSE). He has published over 220 referred journal papers, focused on the following areas: structural nonlinear theory and analysis, vehicle-bridge interaction dynamics, and train-induced wave propagation. In each area he has published a monograph.

Cancellation Conditions for Free Vibration of Damped Simple Beams under Successive Moving Loads

ABSTRACT: In this lecture, the internal and external cancellation phenomena for damped beams subjected to multi-moving loads will be presented. To start, the theory for the vibration of a simply supported beam is revisited by including the effect of damping. For the first time, an expression is derived for the free vibration of the damped beam under multi-moving loads. Based on local minimum, two cancellation conditions are identified. One is the internal cancellation, which relates to the inherent property of the beam and is conventionally known.

The other is the newly formulated external cancellation that relates to the number and spacing of moving loads. For comparison, both the resonant condition and the optimal criterion for span length of the bridge are also briefed. By comparing with the classical solution, the present simple expression for the free vibration of the beam is firstly validated. Then the factors affecting the cancellation are investigated against various load cases and damping levels. The results show that external cancellation occurs more frequently due to the increase in the number and spacing of the moving loads. The damping of the beam has a leaking effect on cancellation, in that nonzero vibration may occur, but it is also quickly damped out by damping itself.

Professor Yu-Jun Cui

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BIOGRAPHY: Professor, doctoral supervisor and expert in unsaturated soil mechanics. He is the head of Geotechnical Engineering Group (CERMES) of Navier Laboratory at Ecole des Ponts ParisTech, concurrently a member of the Council of French Society for Soil Mechanics, a member of Technical Committee of ISSMGE for unsaturated soils (TC106) and for transportation geotechnics (TC202). He is also an Associate Editor of "Canadian Geotechnical Journal", "Journal of Rock Mechanics and Geotechnical Engineering", "Transportation

Geotechnics" and a Panel Member of "Géotechnique Letters". He has participated in the management of a number of EU projects and industrial projects related to different applications of unsaturated soil mechanics. His research interests include laboratory testing, constitutive modelling, environmental geotechnical engineering, railway geotechnical engineering, nuclear waste disposal, lime/cement treatment, soil-vegetation-atmosphere interaction, etc.

Modelling the Permanent Deformation and Resilient Modulus of Coarse/Fine Grains Mixture with consideration of Suction Effect

ABSTRACT: The study presented deals with an interlayer soil which was formed in the French old railway tracks under the decades of traffic loadings. This interlayer soil corresponds to a mixture of ballast grains and fine soil. Based on the results from cyclic triaxial tests under different suctions (defined by given fine dry densities and water contents) and coarse grain contents, a constitutive model was proposed for the permanent strain, allowing the effects of the number of loading cycles, deviator stress and coarse grain content as well as suction to be well accounted for. It appears clearly that for a given fine dry density, decreasing suction leads to an increase of permanent strain. The variation of resilient modulus with suction was also modelled by introducing the water retention property of soil, allowing the description of the combined effect of deviator stress, coarse grain content and suction. The simulations clearly show the decrease of resilient modulus with the increase of water content or decrease of suction, in particular the existence of a threshold suction below which the increase of deviator stress leads to a decrease of resilient modulus, while beyond which the opposed trend occurs.

Professor Xuecheng Bian

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BIOGRAPHY: Dr. Bian Xuecheng is Qishi Distinguished Professor of Zhejiang University. He received his Ph.D. from Okayama University, Japan, and was a visiting professor at the University of Illinois at Urbana-Champaign, USA, and the University of Edinburgh, UK. Dr. Bian's research interests focus on transportation geotechnical engineering, particularly rail geotechnics for high-speed railways. His research has been supported by the National Natural Science Foundation of China (NSFC) and the leading railway industries. His research results

have been widely used in the construction and maintenance of high-speed railways in China. In 2014, he was granted the Newton Advanced Fellowship by the Royal Society, and was granted the Distinguished Young Scientist Award by the National Natural Science Foundation of China in 2021. He is serving as associate editor of the *Transportation Geotechnics and Construction and Building Materials*.

Train Loading Induced Permanent Deformation of Ballast Layer and its Reduction by Asphalt Trackbed

ABSTRACT: Ballasted track has been widely adopted for both conventional railways and high-speed railways. As the train speed increases, ballast particle movements are intensified and considerable permanent deformation in ballast layer may occur under train traffic loads. This study proposes a constitutive model for predicting ballast permanent deformation, incorporating particle breakage and principle stress rotation due to train passages. The rotation of principal stress in ballast layer significantly facilitates the ballast particle movements. The proposed model extends from the existing cyclic densification model, incorporating the Ballast Breakage Index (BBI) to quantify particle breakage and its correlation with permanent deformation. In this model, shakedown thresholds, indicative of material densification, not only increase with plastic strain but also decrease with BBI accounting for breakage-induced loosening in the ballast layer. The proposed prediction model is solved using the implicit Euler-backward algorithm and Newton–Raphson iteration procedure and is integrated into ABAQUS finite element program. The reliability of the proposed model is validated by experimental results from cyclic triaxial tests and full-scale trackbed tests. The results demonstrate that the

proposed model appropriately incorporates particle breakage effects, and accurately predicts ballast permanent deformation under traffic loads. Asphalt trackbed is proposed by insertion of an asphalt layer at the bottom of ballast layer to reduce the vibration and permanent deformation of ballast trackbed under train traffic loads, particularly for high-speed conditions. Asphalt layer helps reduce the intensities of contact forces between ballast particles.

Professor Yoichi Watabe

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BIOGRAPHY: Dr. Yoichi Watabe is a professor at Hokkaido University, Japan, since October 2016. He had been working at Port and Airport Research Institute for more than 20 years after obtaining Doctor of Engineering from Tokyo Institute of Technology in 1995. He has been invited many technical committees for port and airport construction projects. From 1997 to 1999, he spent 2 years at Québec, Canada as a Post-Doctoral Fellow in Laval University. From 2010 to 2014, he was the secretary of the Japanese Geotechnical Society and contributed to

the organization of the 15th Asian Regional Conference of ISSMGE. His main research topics have been consistently on soft clay engineering. He established and chaired an ISSMGE-technical committee: TC217 on “Land Reclamation.” And then, he is chairing ISSMGE TC214 on “Foundation Engineering for Difficult Soft Soil Conditions (Soft Soils).”

Soft Soils in Transportation Geotechnics

ABSTRACT: Soft soils are one of the most fundamental geotechnical engineering problems. Soft soils are not limited to lowland areas such as deltaic deposits near river mouths, but also include inland fluvial and lacustrine deposits, and peaty soils mainly in cold regions as well. The development of railroad and road networks on these soils has caused many geotechnical engineering problems. Soft ground is defined as the relative softness of the ground, not the absolute softness. Even if the ground is regarded sufficiently strong when the size of the structure is small, it may be considered relatively soft when the size of the structure is large because of a high load level. A typical example is the manmade islands of the Kansai International Airport, where more than 15 m of consolidation settlement has occurred. It is notable that about half of consolidation settlement is due to Pleistocene clay layers, which would be regarded stiff for an ordinary structure with a small load level. While many soft ground problems can be solved by ground improvement, the settlement of deep hard ground can only be predicted. This lecture will introduce the geotechnical engineering problems caused by such soft soils from viewpoints related to transportation geotechnics.

Professor Geert Degrande

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BIOGRAPHY: Geert Degrande is professor at the Department of Civil Engineering of KU Leuven in Belgium. He obtained his master and PhD degree in 1986 and 1992 from KU Leuven. He was a visiting researcher at Princeton University in 1989 and postdoctoral researcher at Ecole Centrale de Paris in 1994. He became assistant professor in 1995 and full professor in 2005. He was head of the Department of Civil Engineering from 2008 until 2016 and presently is head of the Structural Mechanics Section. He was Visiting Fellow at Peterhouse and Academic Visitor at the

Department of Engineering of the University of Cambridge during the Michaelmas Term 2022. He is teaching courses on theory of elasticity and plasticity, dynamics of structures, wave propagation and vibration in the built environment, and non-linear structural analysis. His main research interests are structural dynamics, dynamic soil-structure interaction, elastodynamics, computational mechanics, and inverse problems. Emphasis is going to vibration problems in the built environment due to road and railway traffic, industry and construction activities, using both numerical and experimental methods. He has supervised 20 PhD students to completion and published over 110 refereed journal papers and over 280 conference papers. He is subject editor for the Journal of Sound and Vibration (2010-) and serves in the editorial board of Soil Dynamics and Earthquake Engineering (2009-), International Journal of Railway Technology (2012-), Railway Engineering Science (2019-), Transportation Engineering (2020-), Transportation Geotechnics (2021-), and International Journal of Railway Research (2022-). He was co-chair of the 8th International Conference on Structural Dynamics (Eurodyn 2011) in Leuven, Belgium, and chair of the 13th International Workshop on Railway Noise (IWRN13) in Ghent, Belgium.

Prediction and Mitigation of Railway Induced Vibration in the Built Environment

ABSTRACT: During the past decades, considerable progress was made in developing numerical prediction models for railway induced vibration in the built environment. These include, for example, 2.5D and periodic coupled finite element – boundary element (FE-BE) or FE-PML models of the track and soil, as well as 3D FE-BE models for buildings accounting

for dynamic soil-structure interaction (SSI). These models are used to design vibration mitigation measures and to perform environmental impact studies. Accurate numerical prediction of railway induced vibration in buildings remains very challenging, however, given the complexity of the coupled dynamic SSI problems, the wide frequency range of interest, the large number of determining parameters and the uncertainty involved. Industry experiences strong needs to conduct extended parametric studies, to optimize vibration mitigation measures in a robust way, and to quantify and reduce model and parameter uncertainties. We illustrate these challenges by comparison of model predictions with experimental results obtained during a large scale in situ measurement campaign in a three-story reinforced concrete building located close to a ballast track on embankment that is served by freight and passenger trains. We also consider vibration mitigation of an urban tramway on soft soil by means of a (floating) slab track supported by piled foundations. These applications all require detailed vibration prediction models that are fast to run. We therefore investigate the potential of model order reduction techniques to tackle the “curse of dimensionality” and considerably speed-up state-of-the-art prediction models. There also remains a need for scoping models that are fast to run and can be used in an early design phase on a larger urban scale; we therefore developed a hybrid prediction model that combines numerical prediction with experimental results and is integrated in a noise mapping software.

Professor William Powrie

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BIOGRAPHY: William Powrie is Professor of Geotechnical Engineering at the University of Southampton. He is known for his research in environmental and transportation geotechnics, and the behaviour of “difficult” soils and soil-like materials. He is Convenor of the UK Collaboratorium for Research on Infrastructure and Cities and leads the UK Rail Research and Innovation Network Infrastructure Centre of Excellence. He is chair of HS2’s Independent Geotechnical Expert Panel, Geotechnical Consultant to groundwater specialists WJ, and a

Fellow of the UK Royal Academy of Engineering.

Validation Interpretation and Use of Railway Track Acceleration Data

ABSTRACT: It has for many years been relatively straightforward to attach an accelerometer to a railway track and obtain data of track accelerations as trains pass. However, not all devices are suitable and there are a number of potential pitfalls in processing and interpreting the signal. The presentation will discuss these, starting with issues associated with the measurement itself including the required frequency of sampling, filtering and noise. Aspects of interpretation and use of train signature data then be considered, about which there is still some debate. To try and resolve some areas of current difference, the paper will use both original and published data to illustrate the interpretations proposed.

Invited Speakers

Professor Xiaobin Chen

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BIOGRAPHY: Dr. Chen is currently serving as a full professor and the director of the geotechnical engineering department at Central South University. Dr. Chen's research is in the field of railway geotechnics, with a particular focus on coarse-grained soils, including dilation and rheology behaviours, railway embankment (coarse-grained soil fills) design, and foundation protection of existing railway infrastructures. With 15 years of experience at Central South University, he has completed over 50 research projects and published over 150 peer-reviewed journal papers. Dr.

Chen serves as a member of the International Society for Soil Mechanics and Geotechnical Engineering and the Transportation Research Board (TRB) for years. Dr. Chen has developed graduate courses in advanced geotechnical investigation and undergraduate courses in soil mechanics and engineering geology. Dr. Chen enjoys working with academics from diverse backgrounds and cultures.

Slaking Behavior and Nano Lotus Biomimicry Waterproof of Weathered Red Mud Rock (WRM) High-Speed Railway Embankment

ABSTRACT: Red sedimentary rocks account for about 8.61% of the China's land surface, with weathered red mudstones (WRM) being the dominant type. Due to concerns about the embankment problems caused by moisture slaking, such as long-term settlement and untreatable mud pumping, railway companies are currently not allowed to use these WRMS as embankment fills, particularly in the top layer. To address the increasing demand for a reliable waterproof WRMs layer in new railway constructions, experimental tests and DEM simulations were conducted to investigate the XRD, SEM, moisture invasion behaviors, and coarse-grained particle slaking of WRM. Carbon fiber-reinforced bionic MPS, PTFE, and nano lotus biomimicry waterproof WRM layers were developed and tested in the laboratory. In addition, centrifuge model tests and full-scale field tests are motivated to obtain reliable results. This study aims to demonstrate the viability of using local WRM fills to achieve cost savings, environmental protection, and reduced CO₂ emissions.

Professor Takashi Matsumoto

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BIOGRAPHY: Dr. Takashi Matsumoto is currently a professor of Faculty of Public Policy, Hokkaido University, Japan. He graduated from Department of Civil Engineering, University of Tokyo, Japan in 1992, and he received Ph.D. in Civil Engineering at University of Michigan, USA in 1998. His research interest is in the maintenance and durability of bridges and structures with the help of fracture mechanics and micromechanics. Especially, his focus is on the theoretical modeling of fracture and fatigue mechanisms of composite materials and structures. Ongoing research projects include

development of fatigue analysis method of reinforced concrete bridge decks, evaluation of fatigue durability of reinforced concrete and steel bridge decks overlaid with Ultra-High Performance Fiber Reinforced Concrete, and failure mechanisms of carbon fiber reinforced polymer structures. The applications of these technologies to bridges are investigated through experiments and analyses.

Fatigue Analysis of RC Slabs and UHPFRC Applications for Strengthening

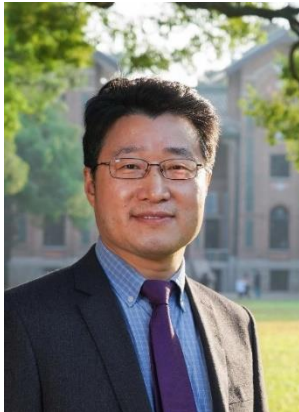
ABSTRACT: Fatigue damage has become apparent in RC slabs of steel bridges in Japan, and repair, strengthening, and replacement have been carried out. Fatigue damage is caused by the repeated traffic of heavy vehicles, and is mainly attributed to the thin slab thickness and small number of distribution rebars in past design standards. In addition to these loading actions, the damage and deterioration of RC slabs due to environmental actions have also become apparent. The problem in snowy and cold regions is the disintegration of concrete, which occurs when the concrete on the top surface of RC slabs develops layered cracks due to freezing and thawing, and the mortar components are pulverized and leached out due to loading actions, leaving only aggregates. The disintegration reduces the effective thickness of the slab and accelerates fatigue damage. UHPFRC (Ultra High Performance Fiber Reinforced Concrete) is expected not only to increase the stiffness and load-bearing capacity of the slab, but also to waterproof the slab due to its dense matrix. In this presentation, the fatigue analysis method of RC slab and the analysis of moving wheel load fatigue will be described, and the effect of design variables on fatigue damage will be numerically investigated. The effect of repair/reinforcement on punching shear and moving wheel load fatigue is numerically investigated by constructing and applying the constitutive law of UHPFRC.

Professor Jiankun Liu

School of Civil Engineering

Sun Yat-Sen University, China

Email: liujiank@mail.sysu.edu.cn



BIOGRAPHY: Dr. Jiankun Liu, Professor, School of Civil Engineering, Sun Yat-sen University. He got his bachelor in Lanzhou University in 1986 and PhD in Moscow State University of Civil Engineering in 1994. His research interests include high-speed railway subgrade dynamics, freeze-thaw stability of subgrade and soil structure design in problematic soil area. He received the second class prize of the National Science and Technology Progress Award in 2013. He is a Fellow of Russian Academy of Transportation Sciences since 2016, he also serves as the associated editor of ASCE Journal

of materials in Civil Engineering and International Journal of Geo-Engineering, editorial board member of the Transportation Geotechnics, Transportation Infrastructure Geotechnology, International Journal of Railway, Journal of Glaciology and Geocryology. Prof. Liu has published more than 220 papers, and was cited about 1200 times. Dr Liu was selected as the top 2% scientists in 2023 by Elsevier.

Warm Permafrost Dynamics and its All Season Cooling System

ABSTRACT: The permafrost in Qinghai-Tibet transportation corridor is usually a warm permafrost, its temperature ranged between -1°C - 0°C , the dynamic properties of it is usually very weak and is of vital importance for engineering design and maintenance. The main dynamics test results for these warm permafrost are presented and all season green method of cooling system is proposed for Tibet condition as a stabilization method of warm permafrost.

Professor Seong-Wan Park

Department of Civil and Environmental Engineering

Dankook University, Korea

Email: spark@dankook.ac.kr



BIOGRAPHY: He is a professor of Geotechnical Engineering at the Dankook University, KOREA, former vice president for international affairs of the Korean Geotechnical Society, a member of Technical Committee of ISSMGE for unsaturated soils (TC106) and for transportation geotechnics (TC202). He is also a Senior Editor of "KSCE Journal of Civil Engineering", former Editor-in-Chief of the Journal of the Korean Geotechnical Society, an Editorial Board Member of "Journal of Transportation Infrastructure Geotechnology". His research interests include numerical modelling, constitutive modelling and experimental testing for environmental geomechanics and road and railway geotechnical engineering as well as unsaturated soil mechanics, etc.

Suction Stress and Mechanical Behavior of Subgrade Soils under Low Confining Pressure

ABSTRACT: The mechanical behavior of subgrade soils beneath the road, which is related to pavement performance, is influenced by water content and is non-linear under low confining stresses. The resilient modulus is a key parameter for understanding and predicting this behavior. However, because the resilient modulus is affected by seasonal water content, it is important to understand how moisture affects it. The suction stress is one of the stress parameters for considering the influence of the moisture condition. Although the application of the suction stress to the mechanical behavior of geomaterials at high confining pressure (up to 1 MPa) has been examined, its role under low confining pressure conditions is not well understood. In this study, the application of the suction stress, derived from the triaxial compression test results for unsaturated soils, to the resilient modulus of subgrade soils was examined. As a result, it was found that the suction stress in terms of confining pressure is valid regardless of the density condition and has an independent effect on the resilient modulus. Thus, it can be said that the suction stress could be a key parameter to reasonably estimate the resilient modulus of unsaturated geomaterials under surface transportation.

Professor Guoqing Jing

School of Civil Engineering

Beijing Jiaotong University, China

Email: gqjing@bjtu.edu.cn



BIOGRAPHY: Dr. Jing is professor of Beijing Jiaotong University, and side-worked as deputy director of State Key Lab of Waterproof of China. Prof. Jing is Committee member of Zhejiang Key Lab of Robot, the above two labs are railway maintenance related. Prof. Jing interests are ballasted track structure and maintenance, i.e., (1) Sleeper ballast aggregates interactions, 3D characterization of ballast using imaging and laser techniques (2) Recycled material for modern ballasted track and innovate structure, i.e., composite sleeper, under sleeper pad or bamboo sleeper, analyses of recycled materials into ballasted track such as tire rubber, asphalt, glass, fiber into concrete sleeper, and even modern steel sleeper, ECC and UHPC sleepers. (3) Ballasted track design and evaluations, exploring railway infrastructure advanced methods of inspection and evaluation, such as GPR, railway robot and drone. Prof. Jing has served as independent investigator on over 20 research projects with grants received from NSFC, CRC, CREC, CRCC, CCCC, with SCI publications of 70+ and citation of 1700 since 2018. Prof. Jing was invited as chief consultant for Mexico, Iran, Russia HSR and Tanzania railway projects.

Ballast Lateral Resistance-Development, Challenge, and Solutions

ABSTRACT: Ballast layer is an important component of superstructure used to transmit vertical loads from sleepers to subgrade. Investigating track lateral buckling, caused by temperature changes and moving trains is a continuing concern within continuously welded rails (CWR) and is also a major issue regarding track stability. Nowadays, the CWR stability is encountering a challenge with extreme weather conditions and variations, with increasing in both speed and loads, and the traditional solutions are focus on ballast bed profile or sleeper size. The presentation mostly deal with sleeper structure and texture innovation, based on investigates ballast lateral resistance mechanism, reinforcement, then develop innovations in structure, shape, texture as well as polyurethane, CA, anchor, nail etc. Ballast-sleeper interactions were investigated by series of full-scale lateral track panel tests (LTPT) and DEM simulations. The 3D scanning is used for ballast and sleeper interface investigations, to explore the sleeper surface texture, friction and roughness effects to lateral resistance.

Professor Satoshi Nishimura

Division of Civil Engineering, Faculty of Engineering

Hokkaido University, Japan

Email: nishimura@eng.hokudai.ac.jp



BIOGRAPHY: Satoshi obtained BEng and MEng from University of Tokyo in 2001 and 2002, respectively, and PhD from Imperial College London in 2006. After two years of post-doc at Imperial College, he worked and as research engineer at Port and Airport Research Institute in Japan, involved mainly in development of ground improvement techniques related to waterfront structures and offshore airports. He has been working at Hokkaido University since 2010. His research expertise is in advanced laboratory soil testing, soil freezing and thawing, (organic) soft soils, earth work monitoring and ground improvement. He is a winner of multiple ICE and JGS awards, and currently serves as Secretary of ISSMGE TC101 (stress-strain-strength). He also serves as an advisor to many public works including nuclear power plants, railways, highways, flood defense structures and landfills.

Cyclic Loading and Wave Propagation in Laboratory Soil Testing: A brief review of history and recent developments

ABSTRACT: Investigating the cyclic response of soils has been an important part of laboratory soil testing at least for half a century, driven by a whole range of engineering motivation. The practice of cyclic testing seems to be ever more important today, as more precise design is desired for infrastructure undergoing extreme cyclic loads, which may bring the ground beyond elastic states. In the meantime, the geotechnical community has seen steady development of laboratory techniques and improved understanding of cyclic soil responses at various states for decades. This lecture briefly reviews this historical context and offers a narrative concerning laboratory cyclic loading, and raises the challenge we are to face in coming years, informed by the recent ISSMGE TC101 symposia/sessions, to which the presenters have long-standing commitment. In discussing the above, recent technical developments in laboratory testing will be introduced, including loading, measurement, and interpretation. These include findings on specimen uniformity during testing through image analysis, better practice of wave propagation testing (shear wave velocity measurement), stiffness anisotropy, stress-strain nonlinearity, strain-rate effects, etc. The relevance of these topics to earthquake, transport and offshore engineering will also be discussed.

Practical Information

Registration

Registration desk will be open on Wednesday, March 6 from 3:00 PM till 5:00 PM, and March 7-8 from 8:30 AM till 5:00 PM at the conference hall lobby of Hokkaido University, Sapporo. Registration fees listed below include access to all the activities for the ISEV 2024 event as shown in the later section. The invoices can be processed in Japanese JPY (¥) or USD (\$) or Chinese RMB (¥).

Participation category	Registration term	Registration rate
Early bird registration	Dec. 31, 2023 ~ Jan. 31, 2024	¥50,000 JPY
Regular registration	Feb. 1, 2024 ~ Mar. 8, 2024	¥60,000 JPY
Early bird registration (Student)	Dec. 31, 2023 ~ Jan. 31, 2024	¥30,000 JPY
Regular registration (Student)	Feb. 1, 2024 ~ Mar. 8, 2024	¥40,000 JPY

What is included in your registration?

- ✓ Welcome Reception on March 6, 2024;
- ✓ Attendance to all ISEV 2024 symposium sessions;
- ✓ Lunch boxes, all tea and coffee refreshments throughout the conference;
- ✓ Conference Dinner on March 7, 2024;
- ✓ All conference materials (including WiFi ID & PWD) with delegate bags or files;
- ✓ An electronic copy of the accepted conference papers (2-3 months after the conference).

Welcome Reception & Conference Dinner

Only registered delegates (with conference name tags) will be allowed access to various dinner parties and conference lunches and coffee breaks. Vouchers for the conference dinner can be purchased on site for ¥6,000 JPY per person on March 6, 2024 during registration. If you would like to bring a guest with you to the Conference Dinner you will have to purchase a voucher.

Climate

From early December, downtown Sapporo transforms into a winter wonderland of pure white snow. Each winter brings with it about five meters of powder snow. However, in March, the temperature gradually begins to rise. The average temperature in early March is -1.3°C , the highest temperature is 2.0°C , and the lowest temperature is -5.0°C . Snowfall can be expected during the conference dates. But, due to freeze-thawing, some parts of winter roads are slippery. Please take care not to slip on icy roads by reading the following leaflet which introduces how

the residents walk on winter roads, their winter clothes and tips on how to prevent slipping on snowy roads. We hope it will be helpful to enjoy your winter stay in Sapporo more:

English leaflet: https://tsurutsuru.jp/pamphlet/Sapporo_Winter_Road_Guide2017_en.pdf

Chinese leaflet: https://tsurutsuru.jp/pamphlet/Sapporo_Winter_Road_Guide2017_ch.pdf

Electricity, Power Supply

100 volts AC, 50Hz. Non-polarized and ungrounded two-pin plugs are most commonly in use. Depending on your country of origin, you may need an adapter.

WiFi

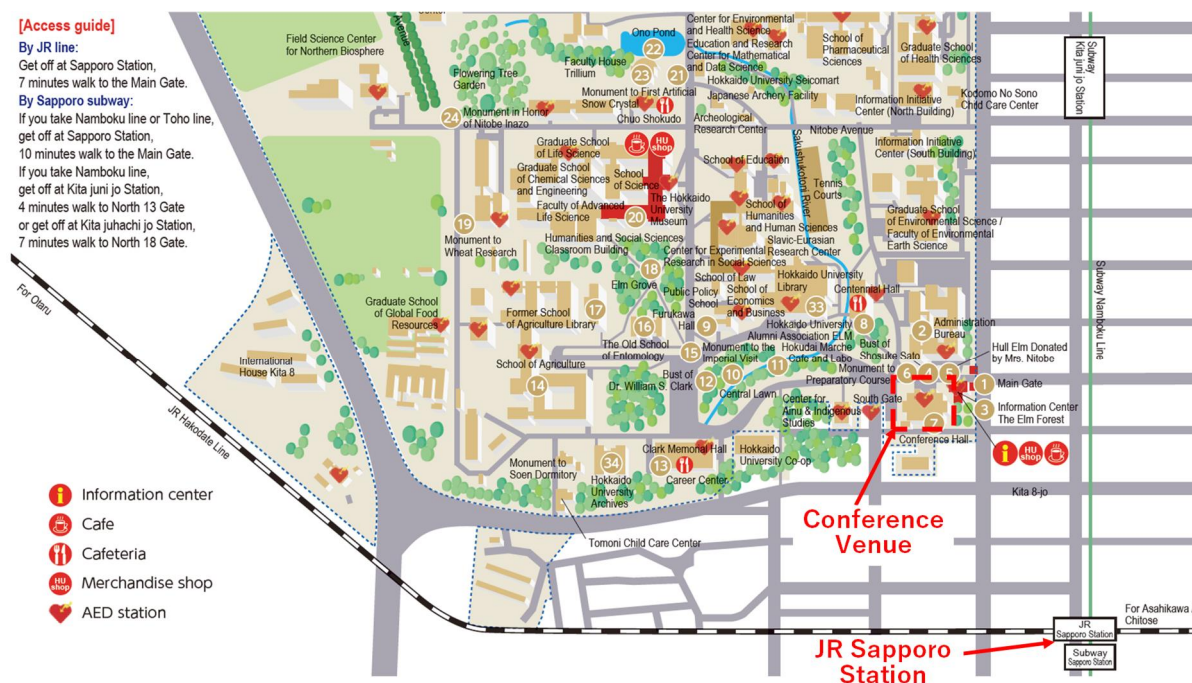
At the conference venue, the delegates can use WiFi by connecting SSID “eduroam” with your own guest-ID and password during March 6-8, 2024. Please note that before using WiFi, you should read "Hokkaido University Wireless LAN System Usage Precautions" and submit the "organizer duplicate document" to the conference secretariat.

Liability

The Local Organizing Committee and/or Conference Organizers shall not be held liable for personal accidents of losses or damage to private property of registered delegates of the Conference. Delegates should make their own arrangements for purchasing personal insurance.

Conference Venue

Conference Hall, Hokkaido University is located near Japanese Railway (JR) Sapporo Station. Kita 8, Nishi 5, Kita-ku, Sapporo, Hokkaido, 060-0808, Japan TEL: +81-11-706-2042



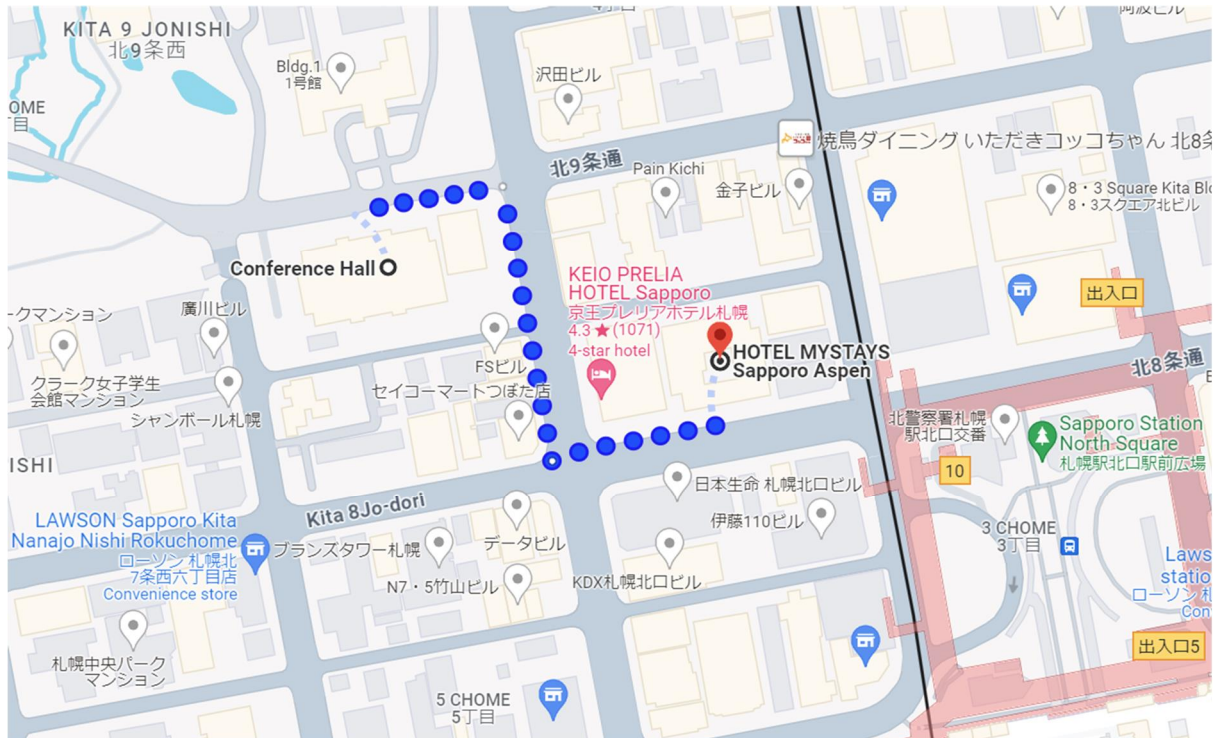
Conference Hall, Hokkaido University

Welcome Reception Venue

Welcome Reception will be held at “HOTEL MYSTAYS Sapporo Aspen” near Japanese Railway (JR) Sapporo Station during 18:00-20:00 on March 6, 2024.

Kita 8, Nishi 4-5, Kita-ku, Sapporo, Hokkaido, 060-0808, Japan

TEL: 011-700-2111

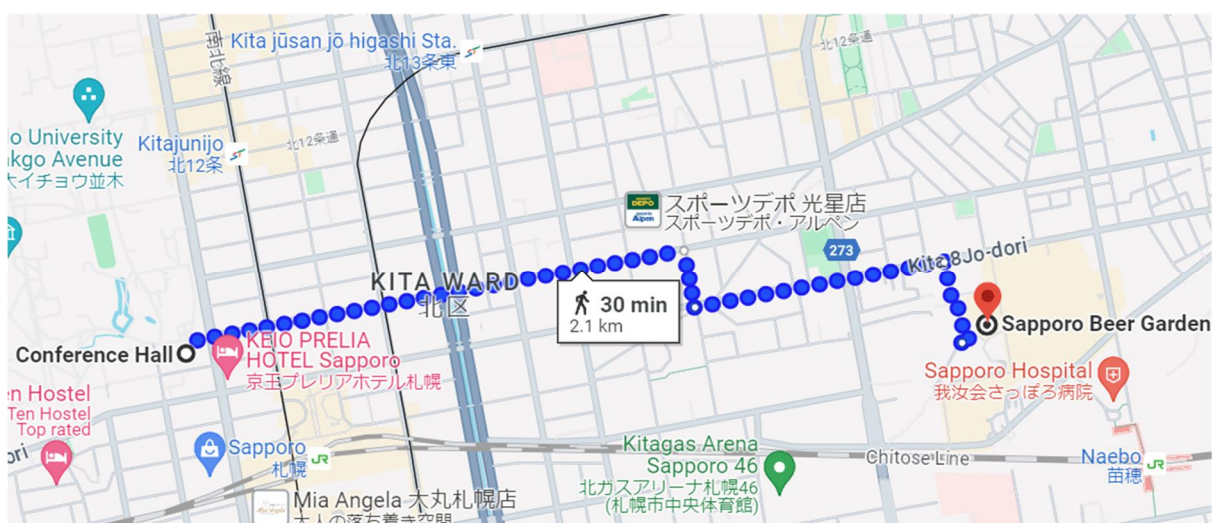


HOTEL MYSTAYS Sapporo Aspen

Conference Dinner Venue

Conference Dinner will be held at “Sapporo Beer Garden” near Japanese Railway (JR) Naebo Station during 18:30-20:30 on March 7, 2024.

Kita 7, Higashi 9-2-10, Higashi-ku, Sapporo, Hokkaido, 065-0007 Japan TEL: 0570-098-346



Sapporo Beer Garden

Public Transportation

From New Chitose Airport to Sapporo

Train:

We strongly recommend catching the 40 minute JR Rapid Airport Line from the airport to Sapporo Station which runs every 15 minutes.

Fare: Adult 1,150 yen/Child 570 yen

Bus:

An express bus, known as the Chuo Bus/Hokuto Kotsu Bus also departs from New Chitose Airport bound for Sapporo station and takes approximately 70 minutes.

Fare: Adult 1,300 yen/Child 650 yen

From Sapporo Station to Hokkaido University

Walk (7 mins):

After arriving at Sapporo Station, it is a short walk to the main gate of the campus. Upon disembarking the train, aim for the west ticket gates and then take the north exit out of the station. Walk down the stairs, cross the pedestrian crossing and veer to the right of the Sunkus Convenience Store. Walk straight, passing the North Pacific Bank on your left, and continue for 4 minutes until you reach an intersection with a Mos Burger on the right and a car park on your left. This is the North 9, West 3 intersection. Turn left here and walk straight to the Main Gate of the campus.

Taxi (5 mins):

If you have luggage or are due to arrive on a snowy or rainy day, we advise catching a taxi from the station to the university. A taxi fare usually starts at and should not be much more than around 700 yen due to the close proximity of the university.

Campus Guide Map

Want a detailed map of the campus to locate our departments, campus shops, ATMs, eateries, and landmarks?

<https://www.global.hokudai.ac.jp/maps/?p=sapporo>

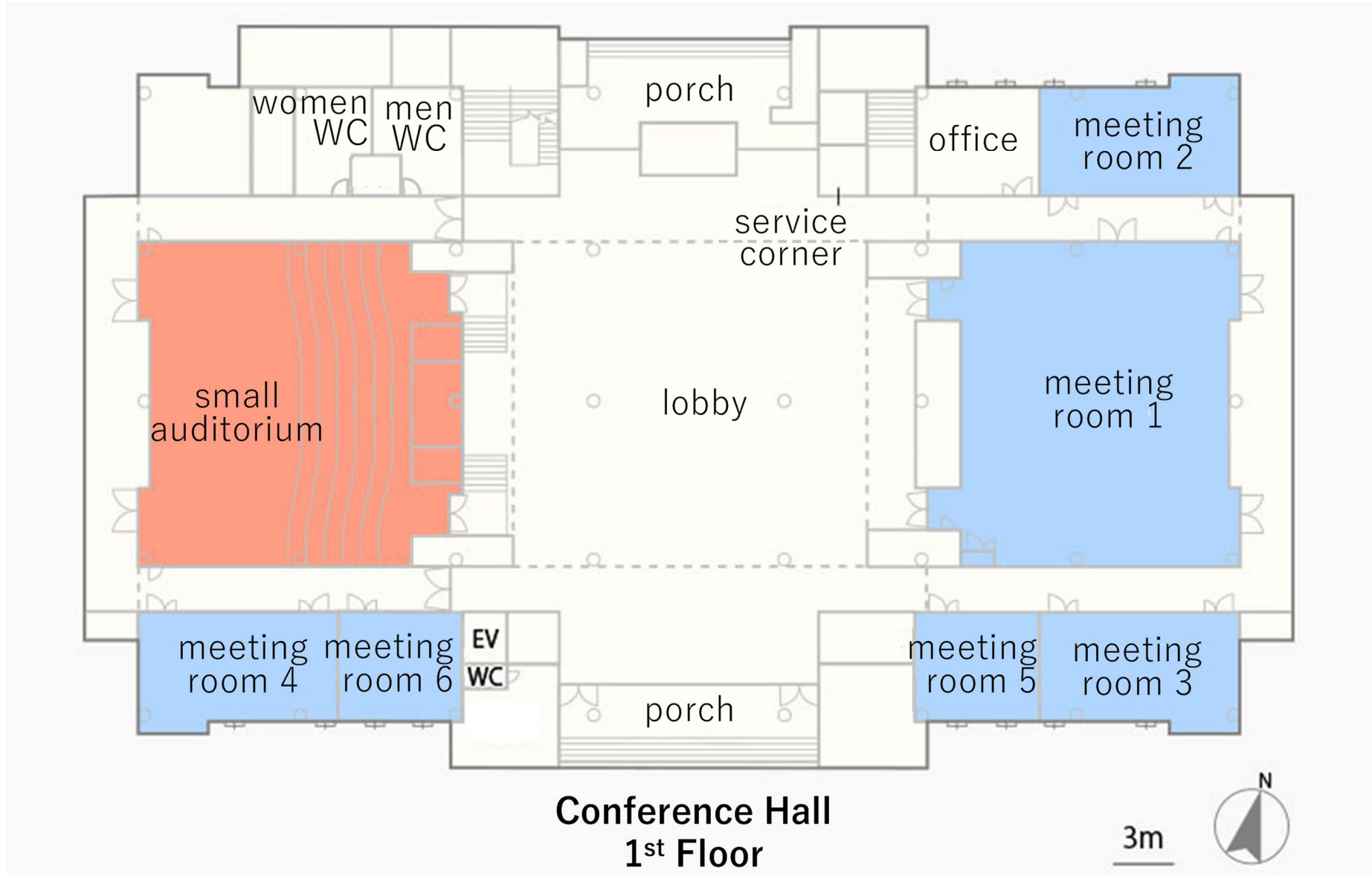
Printable version is also available in multiple languages:

<https://www.global.hokudai.ac.jp/about/publications/campus-map/>

Symposium Program at a Glance

9 th ISEV 2024						
Mar. 6 (Wed.)		Mar. 7 (Thu.)			Mar. 8 (Fri.)	
		08:30-17:00	Registration		08:30-17:00	Registration
		09:00-09:30	Opening Ceremony		09:00-09:30	Keynote speech-5 Prof. William Powrie
		09:30-10:00	Keynote speech-1 Prof. Antonio G. Correia		09:30-10:00	Keynote speech-6 Prof. Yu-Jun Cui
		10:00-10:30	Keynote speech-2 Prof. Yeong-Bin Yang		10:00-10:30	Keynote speech-7 Prof. Geert Degrande
		10:30-11:00	Group Photo & Coffee Break		10:30-11:00	Coffee Break
		11:00-11:30	Keynote speech-3 Prof. Xuecheng Bian		11:00-12:30	General Session-5 (small auditorium)
		11:30-12:00	Keynote speech-4 Prof. Yoichi Watabe			
		12:00-13:00	Lunch			General Session-6 (meeting room 1)
		13:00-13:20	Invited speech-1 Prof. Xiaobin Chen		12:30-13:30	Lunch
		13:20-13:40	Invited speech-2 Prof. Takashi Matsumoto		13:30-13:50	Invited speech-1 Prof. Seong-Wan Park
		13:40-14:00	Invited speech-3 Prof. Jiankun Liu		13:50-14:10	Invited speech-2 Prof. Guoqing Jing
		14:00-14:30	Coffee Break		14:10-14:30	Invited speech-3 Prof. Satoshi Nishimura
					14:30-15:00	Coffee Break
15:00-17:00	Registration at Conference Hall, Hokkaido University	14:30-16:00	General Session-1 (small auditorium)	General Session-2 (meeting room 1)	15:00-16:30	General Session-7 (small auditorium)
		16:00-17:30	General Session-3 (small auditorium)	General Session-4 (meeting room 1)		
					16:30-17:00	Closing Ceremony
18:00-20:00	Welcome Reception at HOTEL MYSTAYS Sapporo Aspen	18:30-20:30	Conference Dinner at Sapporo Beer Garden			

*1 Parallel sessions will be held at two separate rooms inside the conference hall, while single session will be held at "small auditorium".



Detailed Symposium Program

Day 1 March 6, 2024 (Wed.)

15: 00 – 17: 00	Registration [Conference Hall Lobby of Hokkaido University]
18: 00 – 20: 00	Welcome Reception [HOTEL MYSTAYS Sapporo Aspen (Aspen B on Second Floor)]

Day 2 March 7, 2024 (Thu.)

08: 30 – 17: 00	Registration [Conference Hall Lobby of Hokkaido University]
9 th ISEV 2024	
09: 00 – 09: 30	Opening Ceremony [small auditorium] <i>Session Chairs:</i> <i>Tatsuya Ishikawa, Hokkaido University, Japan</i> <i>Erol Tutumluer, University of Illinois at Urbana-Champaign, USA</i> <i>Welcome Addresses:</i> <i>Tatsuya Ishikawa, Hokkaido University, Japan</i> <i>Erol Tutumluer, University of Illinois at Urbana-Champaign, USA</i> <i>Vice President Yoichi Watabe, Japanese Geotechnical Society, Japan</i> <i>Yeong-Bin Yang, Chongqing University, China</i>
09: 30 – 10: 30 Keynote Lecture Session-1 [small auditorium] <i>Session Chairs:</i> <i>Yu-jun CUI, Ecole des Ponts ParisTech, France</i>	
09: 30 – 10: 00	Keynote Speech-1: Experimental and computational model for determining shear modulus of geomaterials by bender element testing and prospects for field evaluation of the stiffness of granular layers <i>Presenter: António Gomes Correia, University of Minho, Portugal</i>
10: 00 – 10: 30	Keynote Speech-2: Cancellation Conditions for Free Vibration of Damped Simple Beams under Successive Moving Loads <i>Presenter: Yeong-Bin YANG, Chongqing University, China</i>
10: 30 – 11: 00	Group Photo [Front Entrance of Conference Hall] & Coffee Break

11: 00 – 12: 30 Keynote Lecture Session-2 [small auditorium] Session Chairs: <i>António Gomes Correia, University of Minho, Portugal</i>	
11: 00 – 11: 30	Keynote Speech-3: Train Loading Induced Permanent Deformation of Ballast Layer and its Reduction by Asphalt Trackbed Presenter: Xuecheng Bian, Zhejiang University, China
11: 30 – 12: 00	Keynote Speech-4: Soft Soils in Transportation Geotechnics Presenter: Yoichi Watabe, Hokkaido University, Japan
12: 00 – 13: 00	Lunch
13: 00 – 14: 00 Invited Lecture Session-1 [small auditorium] Session Chairs: <i>Seong-Wan Park, Dankook University, Korea</i>	
13: 00 – 13: 20	Invited Speech-1: Slaking Behavior and Nano Lotus Biomimicry Waterproof of Weathered Red Mud Rock (WRM) High-Speed Railway Embankment Presenter: Xiaobin Chen, Central South University, China
13: 20 – 13: 40	Invited Speech-2: Fatigue Analysis of RC Slabs and UHPFRC Applications for Strengthening Presenter: Takashi Matsumoto, Hokkaido University, Japan
13: 40 – 14: 00	Invited Speech-3: Warm Permafrost Dynamics and its All Season Cooling System Presenter: Jiankun Liu, Sun Yat-Sen University, China
14: 00 – 14: 30	Coffee Break
14: 30 – 16: 00 General Session-1 [small auditorium] (parallel breakout): Climatic change effects on performance of foundation geomaterials in transportation infrastructure Session Chair: <i>Guoqing Jing, Beijing Jiaotong University, China</i>	
14: 30 – 14: 45	Applicability of Lightweight Geomaterials for the Pavement Subbase in Cold Regions Author(s): Masanori Sugawara, Yukihiro Kohata, Keita Matsuda, Shinichiro Kawabata, Yuki Kikuchi Presenter: Masanori Sugawara, Muroran Institute of Technology, Japan
14: 45 – 15: 00	Review of Research Progress in Temperature Field Analysis of Bridge Structures Author(s): Jianghao Tian, Bin Yan, Xuruili Lou, Limei Yu Presenter: Jianghao Tian, Central South University, China
15: 00 – 15: 15	Research progress and the prospect of roadbed vibration in cold regions of high-speed railway Author(s): Guanwen Liang, Chengpeng Hong, Ying Wu, Haoran Fu, Xuecheng Bian, Chuang Zhao, Jianqun Jiang Presenter: Guanwen Liang, Zhejiang University, China
15: 15 – 15: 30	A Thermal-moisture-dynamic Coupled Model Considering Traffic Loading and Freeze-thaw cycles Author(s): Ying Wu, Chengpeng Hong, Guanwen Liang, Haoran Fu, Xuecheng Bian Presenter: Ying Wu, Zhejiang University, China

15: 30 – 15: 45	<p>Investigation of Reasonable Thickness for Cellular Concrete Aggregate Air Convection Embankment in Alaskan Permafrost Regions Author(s): Hanli Wu, Dawei Wang, Haoran Fuang, Zepeng Fan Presenter: Hanli Wu, Harbin Institute of Technology, China</p>
<p>14: 30 – 16: 00 General Session-2 [meeting room 1] (parallel breakout): Analyses and testing of environmental vibrations induced by vehicle, machine and human <i>Session Chair:</i> <i>Judy Yang, National Yang Ming Chiao Tung University, Chinese Taipei</i></p>	
14: 30 – 14: 45	<p>Fast prediction of ground-borne vibration induced by metro train using the semi-analytical approaches Author(s): Lihui Xu, Meng Ma Presenter: Lihui Xu, Shandong University of Science and Technology, China</p>
14: 45 – 15: 00	<p>Field survey and evaluation method for fouled ballast using transmitted sound characteristics Author(s): Takahisa Nakamura, Takahiro Kageyama Presenter: Takahisa Nakamura, Railway Technical Research Institute, Japan</p>
15: 00 – 15: 15	<p>Evaluation of railway embankment settlements constructed using construction waste soil from tunnel excavation Author(s): Fumika Tajima, Takahiro Kageyama, Takahisa Nakamura, Kazuki Ito, Hiroyuki Kawanakajima, Akira Sakata Presenter: Fumika Tajima, Railway Technical Research Institute, Japan</p>
15: 15 – 15: 30	<p>Investigation on the Hydraulic Behavior of Sandy Fouled Ballast Author(s): Ahmed Nabil Ramadan, Jinxi Zhang, Li Zhang, Biao Xu, Yupeng Shen, Peng Jing Presenter: Ahmed Nabil Ramadan, Beijing University of Technology, China</p>
15: 30 – 15: 45	<p>Flow and vibration characteristics of ballast particles caused by high-speed train loads Author(s): Chuang Zhao, Zheng Luo, Wenqing Cai, Xuecheng Bian, Yun-min Chen Presenter: Chuang Zhao, Zhejiang University, China</p>
<p>16: 00 – 17: 30 General Session-3 [small auditorium] (parallel breakout): Dynamic characteristics of soils and transportation infrastructure <i>Session Chair:</i> <i>Takashi Okayasu, Kyushu University, Japan</i></p>	
16: 00 – 16: 15	<p>Monitoring and analysis of the diaphragm wall construction-induced vibrations in deep sand deposit Author(s): Mu-Zhi Li, Yan-Guo Zhou, Peng-Fei Yao, Duan-Yang Zhuang Presenter: Yan-Guo Zhou, Zhejiang University, China</p>
16: 15 – 16: 30	<p>Identification of excitation forces acting on the tunnel structure for the prediction of ground-borne vibration Author(s): Donghai Li, Weifeng Liu, Chunyang Li Presenter: Donghai Li, Beijing Jiaotong University, China</p>

16: 30 – 16: 45	Frequency Variation in Moving Mass-Bridge Systems of Civil Structures Author(s): Judy Yang, Shuo Huang, Jong-Dar Yau Presenter: Judy Yang, National Yang Ming Chiao Tung University, Taiwan
16: 45 – 17: 00	Adaptability of High-Speed-Railway Long-Span Cable-Stayed-Bridge with Ballastless Tracks Author(s): Bin Yan, Hexin Fu, Limei Yu, Haoran Xie Presenter: Hexin Fu, Central South University, China
17: 00 – 17: 15	Study on dynamic prediction driven by data-physics of surface settlement induced by shield tunnel construction Author(s): Fang Dai, You Wang Presenter: Fang Dai, Central South University, China
16: 00 – 17: 30 General Session-4 [meeting room 1] (parallel breakout): Stabilization/reinforcement of foundation geomaterials of transportation infrastructure <i>Session Chair:</i> <i>Xuecheng Bian, Zhejiang University, China</i>	
16: 00 – 16: 15	Physical model tests of geocell reinforced soil foundation under moving wheel condition Author(s): Shintaro Miyamoto, Yoshihisa Miyata Presenter: Shintaro Miyamoto, National Defense Academy, Japan
16: 15 – 16: 30	Effect of octadecylamine on hydrophobic properties of red-bed mudstone subgrade fillers Author(s): Yuqing Zhou, Xiaobin Chen, Zhaosheng Yu, Jiasheng Zhang, Mengli Wu Presenter: Yuqing Zhou, Central South University, China
16: 30 – 16: 45	Horizontal resistance characteristics and simple evaluation method of coupled foundation for vehicle protection fence utilizing pull-out resistance of cast iron spiral piles Author(s): Takahiro Kurokawa, Noriyuki Yasufuku, Yuta Ide, Makoto Nagata Presenter: Takahiro Kurokawa, Hinode Holdings Co., Ltd, Japan
16: 45 – 17: 00	Metal Ion Complex Impact on ζ Potential during Shield Muck Solidification Author(s): Bosong Ding, Ping Lou, Rui Wang, Zhenyu Wang, You Wang Presenter: Bosong Ding, Central South University, China
17: 00 – 17: 15	Research on field compaction characteristics of cement-stabilized recycled aggregate road subgrade based on SmartRock Author(s): Yuanjie Xiao, Tao Yang, Meng Wang, Yuliang Chen, Fanwei Meng, Xiaoming Wang, Wenjun Hua Presenter: Tao Yang, Central South University, China
18: 30 – 20: 30	Conference Dinner [Sapporo Beer Garden]

Day 3 March 8, 2024 (Fri.)

08: 30 – 17: 00	Registration [Conference Hall Lobby of Hokkaido University]
9 th ISEV 2024	
09: 00 – 10: 30 Keynote Lecture Session-3 [small auditorium] <i>Session Chairs:</i> <i>Xiaobin Chen, Central South University, China</i>	
09: 00 – 09: 30	Keynote Speech-6: Validation Interpretation and Use of Railway Track Acceleration Data Presenter: William Powrie, University of Southampton, UK
09: 30 – 10: 00	Keynote Speech-7: Modelling the Permanent Deformation and Resilient Modulus of Coarse/Fine Grains Mixture with consideration of Suction Effect Presenter: Yu-jun CUI, Ecole des Ponts ParisTech, France
10: 00 – 10: 30	Keynote Speech-8: Prediction and Mitigation of Railway Induced Vibration in the Built Environment Presenter: Geert Degrande, KU Leuven, Belgium
10: 30 – 11: 00	Coffee Break
11: 00 – 12: 30 General Session-5 [small auditorium] (parallel breakout): Monitoring, evaluation and control of traffic induced vibrations of roads, railways and airfields <i>Session Chair:</i> <i>Kimitoshi Hayano, Yokohama National University, Japan</i>	
11: 00 – 11: 15	Study on relationship between road profile and structural damage of the pavement Author(s): Masakazu Jomoto, Akira Kawamura Presenter: Masakazu Jomoto, TR-Consultant Corporation, Japan
11: 15 – 11: 30	Field monitoring and analysis of ground surface and adjacent single pile vibrational responses induced by metro tunnel shield construction Author(s): Rui Wang, Bin Yan, Bo-song Ding, You Wang Presenter: Rui Wang, Central South University, China
11: 30 – 11: 45	Intelligent evaluation method of pavement performance by monitoring the vibration of vehicle Author(s): Wangda Guo, Jinxi Zhang, Yuxuan Zhang, Pei Li, Lei Nie Presenter: Jinxi Zhang, Beijing University of Technology, China
11: 45 – 12: 00	Study on vehicle-induced vibration and secondary noise caused by GTC introduced in high-speed railway Author(s): Yiting Chen, Fangbo Liu, Jizhong Yang, Dubei Feng, Man Peng Presenter: Yiting Chen, China Railway Eryuan Engineering Group Co.Ltd, China
12: 00 – 12: 15	Three-dimensional Discrete Element Analysis of Crushing and Mixing Behavior of Existing Pavement Layer by Stabilizer Author(s): Toyohiro Katou, Yuta Hirayam, Takatomo Fujii, Takashi Kurosu, Osamu Oikawa, Takashi Okayasu Presenter: Toyohiro Katou, Kyushu University, Japan

11: 00 – 12: 30 General Session-6 [meeting room 1] (parallel breakout): Advances in geomaterial characterization, laboratory and field evaluation, and full scale testing <i>Session Chair:</i> <i>Yuanjie Xiao, Central South University, China</i>	
11: 00 – 11: 15	Effects of biochar on the physical properties and frost heave characteristic of Lanzhou loess Author(s): Yongjia Wang, Xiang Li, Yiqing Pu, Nan Zhou, Junping Ren Presenter: Yongjia Wang, Lanzhou University, China
11: 15 – 11: 30	Effect of Principal Stress Axis Rotation on Resilient and Permanent Axial Strains of Unbound Aggregate Materials Author(s): Daoju Ren, Tatsuya Ishikawa, Tetsuya Tokoro Presenter: Daoju Ren, Hokkaido University, Japan
11: 30 – 11: 45	Numerical investigation on the slurry penetration performance of pulsating pressure Author(s): Lubo Tang, Xiaobin Chen, Jiasheng Zhang, Jiarui Luo, Fantong Lin Presenter: Lubo Tang, Central South University, China
11: 45 – 12: 00	Safety Risk Assessment of Levee Structure Based on VIKOR Method and AHP-CRITIC Method Author(s): QianJun Fan, RuXue Jia, Fang Dai, You Wang Presenter: QianJun Fan, Central South University, China
12: 00 – 12: 15	A New Degradation Model for Rock Blocks to Simulate the Compressive Behaviors of Soil-rock Mixtures Author(s): Junhua Xiao, Siqi Sun, Zhiyong Liu, Yingqi Bai, Jie Shan, Binglong Wang Presenter: Junhua Xiao, Tongji University, China
12: 30 – 13: 30	Lunch
13: 30 – 14: 30 Invited Lecture Session-2 [small auditorium] <i>Session Chair:</i> <i>Jiankun Liu, Sun Yat-Sen University, China</i>	
13: 30 – 13: 50	Invited Speech-4: Suction Stress and Mechanical Behavior of Subgrade Soils under Low Confining Pressure Presenter: Seong-Wan Park, Dankook University, Korea
13: 50 – 14: 10	Invited Speech-5: Ballast Lateral Resistance-Development, Challenge, and Solutions Presenter: Guoqing Jing, Beijing Jiaotong University, China
14: 10 – 14: 30	Invited Speech-6: Cyclic Loading and Wave Propagation in Laboratory Soil Testing: A brief review of history and recent developments Presenter: Satoshi Nishimura, Hokkaido University, Japan
14: 30 – 15: 00	Coffee Break

<p>15: 00 – 16: 30 General Session-7 [small auditorium] (parallel breakout): Dynamic interaction of vehicle and transportation infrastructure <i>Session Chair:</i> <i>Yoshitsugu Momoya, Railway Technical Research Institute, Japan</i></p>	
15: 00 – 15: 15	<p>A simple prediction method for cyclic plastic deformation of aged ballast in consideration of water content variation Author(s): Abhay Kumar, Tatsuya Ishikawa, Namit Jain, Erol Tutumluer Presenter: Abhay Kumar, Hokkaido University, Japan</p>
15: 15 – 15: 30	<p>Numerical Simulation on the Influence of Ballast Aging and Water Content on Track Settlement Author(s): Namit Jain, Tatsuya Ishikawa, Abhay Kumar, Erol Tutumluer Presenter: Namit Jain, Hokkaido University, Japan</p>
15: 30 – 15: 45	<p>Fundamental Study on Response Characteristics of Supported and Unsupported Sleepers of Ballasted Tracks under Moving and Dynamic Lateral Loading Author(s): Xu Chong, Takahisa Nakamura, Kimitoshi Hayano Presenter: Xu Chong, Yokohama National University, Japan</p>
15: 45 – 16: 00	<p>Investigating the mechanism of under-sleeper pads influencing lateral resistance of ballasted trackbed based on coupled discrete element-finite difference method (DEM-FDM) simulations Author(s): Tan Pan, Yuanjie Xiao, Jiang Yu, Wang Meng, Xiaoming Wang, Chongchong Zhang, Erol Tutumluer Presenter: Yuanjie Xiao, Central South University, China</p>
16: 00 – 16: 15	<p>Analytical study on the dynamic response of sandwich plate with coordinate-dependent material parameters caused by metro trains Author(s): Wanbo Li, Weifeng Liu Presenter: Wanbo Li, Beijing Jiaotong University, China</p>
16: 30 – 17: 00	<p>Closing Ceremony [small auditorium] <i>Session Chairs:</i> <i>Tatsuya Ishikawa, Hokkaido University, Japan</i> <i>Erol Tutumluer, University of Illinois at Urbana-Champaign, USA</i> Farewell Addresses: Tatsuya Ishikawa, Hokkaido University, Japan Erol Tutumluer, University of Illinois at Urbana-Champaign, USA Xuecheng Bian, Zhejiang University, China Xiaobin Chen, Central South University, China 10th ISEV Symposium</p>