IFRERM 2023

International Forum on Reliability Engineering and Risk Management 2023

February 23-26, 2023

Kanagawa University, Yokohama, Japan

Organized by Kanagawa University

Sponsored by Beijing University of Technology

International Association on Reliability Engineering and Risk Management

IARERM
A SAFER FUTURE

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Yuki Shirai	Yu-Tao Lu	

Forum Timetable

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<tr><td></td><td>Break＆Group photos
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<tr><td></td><td>ZOOM Test
[10:00-12:30]</td><td rowspan="2">Keynote Lecture 1-2
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<tr><td></td><td>Lunch Time
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<tr><td>Afternoon</td><td rowspan="3">Reception
(Room 307,Building 3,
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[13:30-18:00]</td><td>Keynote Lecture 3-4
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<tr><td></td><td>Parallel Sessions 1-8
(ZOOM＆Room 307, 302,
303 and 304)
[16:10-17:55]</td></tr>
<tr><td></td><td>Closing Ceremony
(ZOOM＆Room 307)
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[February 23, 2023]

10:00 - 12:30,	**ZOOM Test**
13:30 - 18:00,	**Reception (On site)**

[February 24, 2023]

Opening Ceremony **Chair: Prof. Haizhong Zhang**

9:00 - 9:15	Prof. Makoto Oguma, President, Kanagawa University Prof. Seizo Uchida, Dean, Faculty of Architectural, Kanagawa University Prof. Zhao-Hui Lu, President, IARERM
9:15 - 9:25	**Break & Group photos**

Keynote Lecture 1 **Chair: Prof. Michael Beer**

9:25 - 9:55	Data-driven geological modelling based on Potts model Prof. Kok-Kwang Phoon, Singapore University of Technology and Design
9:55 - 10:25	Probabilistic seismic drift demand on SMRF based on extended modal analysis and natural-period-dependent spectrum intensity Prof. Yasuhiro Mori, Nagoya University
10:25 -10:55	Seismic performance assessment method for a deteriorated RC building structure Prof. Chien-Kuo Chiu, National Taiwan University of Science and Technology
10:55 - 11:00	**Break**

Keynote Lecture 2 **Chair: Prof. Chien-Kuo Chiu**

11:00 - 11:30	Effective systems modeling for decision-making in complex environments Prof. Michael Beer, Leibniz Universität Hannover
11:30 - 12:00	Distribution-free approach for stochastic model updating under hybrid uncertainties Prof. Takeshi Kitahara, Kanto Gakuin University
12:00 - 12:30	Estimation of input energy spectrum from pseudo-velocity response spectrum incorporating the influences of magnitude, distance, and site conditions Prof. Haizhong Zhang, Kanagawa University
12:30 - 13:30	**Lunch Time**

Keynote Lecture 3 **Chair: Prof. Kok-Kwang Phoon**

13:30 - 14:00 Efficient moment-based outcrossing rate method for time-dependent reliability
Prof. Xuan-Yi Zhang, Beijing University of Technology

14:00 - 14:30 Large-scale shake table testing and refined numerical simulation research on seismic failure mechanism of inclined liquefiable site-pile group foundation-superstructure
Prof. Chengshun Xu, Beijing University of Technology

14:30 - 15:00 Physically driven globally-evolving-based generalized density evolution equation for systems involving randomness in both structural parameters and excitations
Prof. Jianbing Chen, Tongji University

15:00 - 15:05 **Break**

Keynote Lecture 4 **Chair: Prof. Yasuhiro Mori**

15:05 - 15:35 Research on key issues of seismic zoning in sea areas and its demonstration application
Prof. Xiaojun Li, Beijing University of Technology

15:35 - 16:05 Methods of moment for structural dynamic reliability analysis involving non-stationary non-Gaussian response
Prof. Zhao-Hui Lu, Beijing University of Technology

16:05 - 16:10 **Break**

Parallel Session 1 **Chair: Prof. Xiaojun Li**

16:10 - 16:20 A new 3-parameter distribution and its application to architecture system
Yu-Tao Lu

16:20 - 16:30 Equivalent expectation evaluation method for approximating the probability distribution of performance functions
Changxing Zou

16:30 - 16:40 Life-cycle risk-cost optimized maintenance strategy for heavy-haul railway
Zewei Song

16:40 - 16:50 TMI method for reliability analysis with uncertain moments measured as interval variables
Boyu Wang

16:50 - 17:00 A stable method for time-dependent reliability analysis
Jiahao Xu

17:00 - 17:05 **Break**

Parallel Session 2 **Chair: Prof. Masanori Fujita**

16:10 - 16:20 Energy method of confined concrete in axially compressed circular concrete-filled steel tube columns
Di Yang

16:20 - 16:30 An innovative method for space-time-dependent reliability analysis
Haopeng Qiao

16:30 - 16:40 Life cycle risk-cost optimal maintenance strategy for CRTS II track slab
Zong Liu

16:40 - 16:50 Crack resistance reliability study of CRTS III rail slab on bridge
Bingliang Jia

16:50 - 17:00 Generalized bivariate mixture model of directional wind speed in mixed wind climates
Zhengbing Cheng

17:00 - 17:05 **Break**

Parallel Session 3 **Chair: Prof. Yoshiharu Shumuta**

16:10 - 16:20 Effect of input seismic motion on the energy spectral ratio
Ying-Chi Fang

16:20 - 16:30 Maintenance strategy of buried water supply pipeline based on time-varying reliability
Guochuan Sun

16:30 - 16:40 Time-dependent durability reliability analysis of heavy-haul railway prestressed concrete bridge
Zhihong Jia

16:40 - 16:50 Compression performance of circular CFDST short columns with eccentric inner steel tube
Wei Fu

16:50 - 17:00 A simple third-moment reliability index
Jiayi Cai

17:00 - 17:05 **Break**

Parallel Session 4 **Chair: Prof. Jianbing Chen**

16:10 - 16:20	Structural reliability analysis using information exchange particle swarm optimization algorithm Lixiang Cheng
16:20 - 16:30	Network connectivity reliability analysis based on numerical simulation Xiaowen Wang
16:30 - 16:40	Design and numerical analysis of a precast fully-bolted PEC beam to CFST column connection Yuexi He
16:40 - 16:50	Seismic fragility analysis of steel staggered truss framing structure Huijuan Liu
16:50 - 17:00	CAP1400 seismic integrated probabilistic safety assessment Xiaobin Wang
17:00 - 17:05	**Break**

Parallel Session 5 **Chair: Prof. Zhao-Hui Lu**

17:05 - 17:15	Estimating multivariate extreme wind pressure coefficients from short-term wind tunnel data Feng Li
17:15 - 17:25	Service condition assessment of heavy-haul railway bridge Geyang Zheng
17:25 - 17:35	Rapid estimation of wind pressure extremum based on generalized extremum distribution of moments Chunyue Zou
17:35 - 17:45	Time-dependent system reliability methods: case study Ze Li
17:45 - 17:55	Extreme value estimation of wind effect based on Pearson system translation process Tianfeng Wang

Parallel Session 6 **Chair: Prof. Xuan-Yi Zhang**

17:05 - 17:15 The mixing proportion design method of high-strength recycled aggregate concrete
Zhihui Liu

17:15 - 17:25 Explicit model of outcrossing rate for time-dependent reliability analysis
Xiangwei Li

17:25 - 17:35 Power spectrum model considering source characteristics
Dengke Jiu

17:35 - 17:45 Optimal placement of sensors and damage identification for space structure considering randomness
Maolin Cong

17:45 - 17:55 Design applicable formulation for damping modification factor considering influences of magnitude, distance, and site conditions
Jia Deng

Parallel Session 7 **Chair: Prof. Takeshi Kitahara**

17:05 - 17:15 Time-dependent fatigue reliability analysis of heavy-haul railway steel bridge
Shengwang Zhang

17:15 - 17:25 Wind vibration response analysis of vertical circulating mechanical parking system
Jinzhao Gao

17:25 - 17:35 Refined fragility assessment of low-rise buildings subject to wind hazards
Dawei Xu

17:35 - 17:45 Seismic performance of the circular concrete-filled steel tubular with local corrosion
Zhenjun Zhang

Parallel Session 8 **Chair: Prof. Yuki Shirai**

17:05 - 17:15	A stiffness model of corroded post-tensioned concrete beams for whole loading process Zhongning Yang
17:15 - 17:25	A conditional extreme value distribution method for dynamic reliability analysis of stochastic structures Yeyao Weng
17:25 - 17:35	Pseudo-velocity response spectrum to velocity response spectrum conversion model Zheng Liu
17:35 - 17:45	An efficient method for probability prediction of peak ground acceleration using Fourier amplitude spectral model Rui Zhang

Closing Ceremony

17:55 - 18:00	Prof. Yan-Gang Zhao, Kanagawa University Prof. Chengshun Xu, Beijing University of Technology

Introduction to keynote speakers

Kok-Kwang Phoon is Cheng Tsang Man Chair Professor and Provost, Singapore University of Technology and Design (SUTD). He obtained his BEng and MEng from the National University of Singapore and his PhD from Cornell University. Prof Phoon. is particularly interested in developing statistical and other data-driven methods to support decision making in geotechnical engineering. He has edited 3 books and authored 1 book: Model Uncertainties in Foundation Design (CRC Press, 2021). He was bestowed the ASCE Norman Medal twice in 2005 and 2020, and the Humboldt Research Award in 2017, among many others. He is the Founding Editor of Georisk and past Chair of ISSMGE TC304. He was elected as a Fellow of the Academy of Engineering Singapore in 2012.

Yasuhiro Mori is Professor of Dept. of Environmental Engineering and Architecture, Nagoya University, Japan since 2006. He obtained a doctoral degree from The Johns Hopkins University in 1993 and pursued post-doctoral research at the same University. Dr. Mori joined Nagoya University as an Assistance Professor in 1994 and worked as an Associate Professor from 1995 to 2006. Dr. Mori's research is focused on time-dependent reliability, reliability-based structural design, and seismic hazard and risk analysis. His publications include several monographs and a large number of journal and conference papers. He has served the Convenor of ISO/TC98/SC2/WG8 for ISO 22111:2019 Bases for design of structures — General requirements. Dr. Mori also serves on Editorial Board of Structural Safety. He is the Chairman of the Managing Committee on Loads and Actions on Buildings, AIJ. Dr. Mori is a Member of ASCE, AIJ, JCSS, ISO/TC98, etc.

Chien-Kuo Chiu is the chairman of Dept. of Civil and Construction Engineering in Taiwan TECH. He is still the chairman of Chinese Society of Structural Engineering in Taiwan. His main research is focused on the life-cycle assessment methods of seismic performance and durability for reinforced concrete structures. He has published more than 50 papers in the international journals. Recently, he also helped the government to publish a guidebook related to the durability assessment technology of RC building structures in Taiwan.

Michael Beer is Professor and Head of the Institute for Risk and Reliability, Leibniz Universität Hannover, Germany, since 2015. He is also part time Professor at the University of Liverpool and guest Professor at Tongji University and Tsinghua University, China. He obtained a doctoral degree from Technical University Dresden and pursued post-doctoral research at Rice University. From 2007 to 2011 Dr. Beer worked as an Assistant Professor at National University of Singapore. In 2011 he joined the University of Liverpool as Chair in Uncertainty in Engineering and Founding Director of the Institute for Risk and Uncertainty and established a large Doctoral Training Center on Quantification and Management of Risk & Uncertainty. Dr. Beer's research is focused on uncertainty quantification in engineering with emphasis on imprecise probabilities. Dr. Beer is Editor in Chief of the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A Civil Engineering and Part B Mechanical Engineering. He is also Editor in Chief (joint) of the Encyclopedia of Earthquake Engineering, and Associate Editor of Information Sciences. Further, Dr. Beer is serving on thirteen Editorial Boards including Probabilistic Engineering Mechanics, Computers & Structures, Structural Safety, Mechanical Systems and Signal Processing, Engineering Structures, and the International Journal for Uncertainty Quantification. He has won several awards including the Alfredo Ang Award on Risk Analysis and Management of Civil Infrastructure of ASCE, the Donald Julius Groen Prize of the Safety & Reliability Group of the Institution of Mechanical Engineers, the CADLM PRIZE 2007 – Intelligent Optimal Design and a Certificate for Highly Cited Research in Structural Safety. His publications include a book, several monographs and a large number of journal and conference papers.

Takeshi Kitahara is a Professor and Head of the Master's Course in Civil Engineering at Kanto Gakuin University, Japan. He obtained a master's degree from Kyoto University, and a doctorate degree from Nagoya University, Japan. He worked for the Research & Development Institute of Takenaka Corporation and Gunma National College of Technology. Dr. Kitahara's research is focused on structural reliability considering hybrid uncertainties in dynamic problems. He is also interested in applying AI and Data Science methods to a broader field of science. Dr. Kitahara is a Chairman of the JSCE Structural Safety Sub-committee. He is also a Chairman of the Japan Conference on Structural Safety and Reliability 2023 and was Editor in Chief of the Journal of Structural Engineering, JSCE. He is a Member of JSCE, ASCE, ESRA, IABSE, IABMAS, IALCCE, JAEE, JSSC, JCI, and AIJ.

Haizhong Zhang is the assistant professor at the Department of Architecture in Kanagawa University, Japan. He graduated from Kanagawa University in 2018 and got his doctor degree. He has been engaged in teaching and scientific research in the field of earthquake engineering of structures for a long time. He has got some innovative research achievements in terms of seismic hazard analysis, seismic load setting, site effects, response spectrum damping adjustment coefficient, and transformation between different load forms. His research achievements have been published in many academic journals, including 14 papers in SCI journals.

Xuanyi Zhang is an associate professor at Beijing University of Technology, China. She is mainly engaged in the theoretical research of structural reliability. Her main research interests include normal and inverse normal transformation based on moments, system reliability method, outcrossing rate method for time-dependent reliability analysis and time-space-dependent reliability analysis under imprecise information. Her research achievements have been published in many academic journals, including 19 papers in SCI/EI journals.

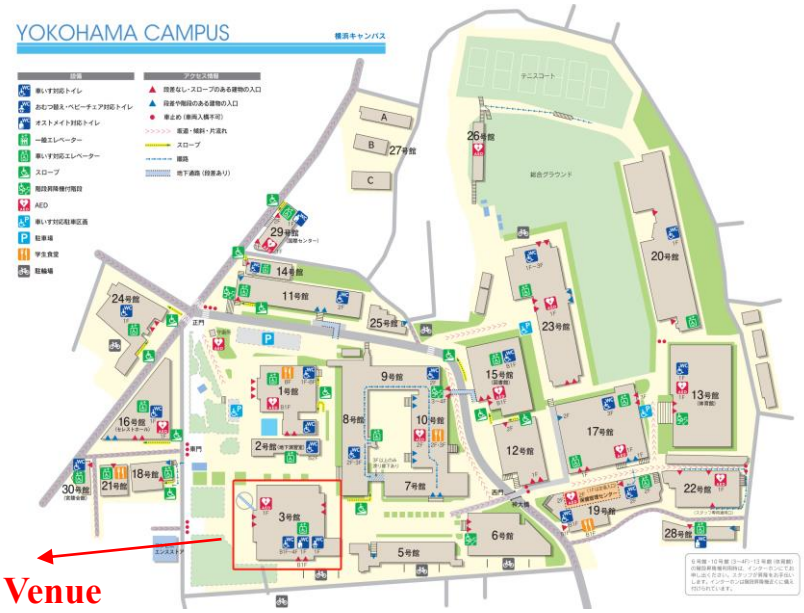
Chengshun Xu, Ph.D., the recipient of the National Outstanding Young Fund, is doctoral supervisor and director of Faculty of Architecture, Civil and Transportation Engineering at Beijing University of Technology. She is also the deputy director of the Geotechnical Engineering Seismic and Disaster Prevention and Mitigation Committee of the China Earthquake Society and the executive deputy director of the Key Laboratory of Urban and Engineering Safety and Disaster Mitigation of the Ministry of Education. She is mainly engaged in research on basic theory and methods of saturated soil dynamics, seismic performance evaluation of soil-structure interaction system, seismic disaster prevention of infrastructure structures and systems. She has made significant achievements in the research of static/dynamic behaviors of saturated soil under complex loading conditions, site failure and dynamic response analysis of site-pile-superstructure interaction system, and theory and methods of seismic design of subway station structures. She has been the principal investigator of 3 national key projects and 5 research projects funded by the National Natural Science Foundation of China (NSFC) and was awarded the second prize of National Science and Technology Progress Award (ranked 5). She has published more than 70 papers as the first/corresponding author in the last 5 years.

Jianbing Chen is currently University Distinguished Professor on the faculty at Tongji University in the College of Civil Engineering. He specializes in the area of uncertainty quantification, stochastic mechanics, and engineering reliability. Dr. Chen received his Ph.D. in Civil Engineering from Tongji University, China in 2002. He has been a visiting scholar/professor in the universities in US, Denmark and Austria. Dr. Chen is the co-editor of 6 international conference proceedings and co-author of 4 books and over 230 technical publications, including 170 peer-reviewed journal papers. He received the National Natural Science Award of China (2nd class) and the 2017 IASSAR Early Achievement Award by the International Association for Structural Safety and Reliability (IASSAR) and was granted by the National Science Fund for Distinguished Young Scholars (2017). He now serves as Executive Board member of the International Association for Structural Safety and Reliability (IASSAR), member of Board of Directors of the International Civil Engineering Risk and Reliability Association (CERRA), co-reporter of WP1 of the international Joint Committee on Structural Safety (JCSS), and Chairman of Random Vibration Committee of Chinese Society for Vibration Engineering. Dr. Chen also serves as the Associate Editors of the journals Structure and Infrastructure Engineering, ASCE-ASME Journal on Risk and Uncertainty in Engineering Systems (Part A & Part B) and Journal of Vibration Engineering (in Chinese) and serves in several editorial boards of the journals, including Structural Safety, Probabilistic Engineering Mechanics, etc.

Xiaojun Li is a professor of Faculty of Urban Construction, Beijing University of Technology. He is also part time research professor of the Institute of Geophysics, China Earthquake Administration. He is still the vice chairman of the Seismological Society of China and the Member of Executive Committee of International Society of Lifeline and Infrastructure Earthquake Engineering. His research covers the seismology, earthquake engineering and earthquake disaster risk, and his main research is focused on the strong ground motion observation and characteristic analysis, numerical simulation of seismic wave, determination of site design ground motion, earthquake risk analysis.

Zhao-Hui Lu is currently a professor of Faculty of Architecture, Civil and Transportation Engineering at Beijing University of Technology. His expertise includes structural reliability assessment based on methods of moment and risk-cost optimized maintenance strategy for concrete structures with emphasis on high-speed railway engineering structures using time-dependent reliability method. He has chaired and participated in more than 10 research projects including the National Natural Science Fund for Excellent Young Scholars of China and Key Projects of International Cooperation and Exchanges from NSFC. Prof. Lu is the author or co-author of more than 100 articles in various technical journals such as ASCE Journal of Structural Engineering, ASCE Journal of Engineering Mechanics, and co-author of one monograph with title of "Structural Reliability: Approaches from Perspectives of Statistical Moments". He was awarded the First prize of Railway Science and Technology of China Railway Association in 2014 and in 2020 respectively due to his innovative and significant contribution in the field. (E-mail address: luzhaohui@bjut.edu.cn).

Forum venue



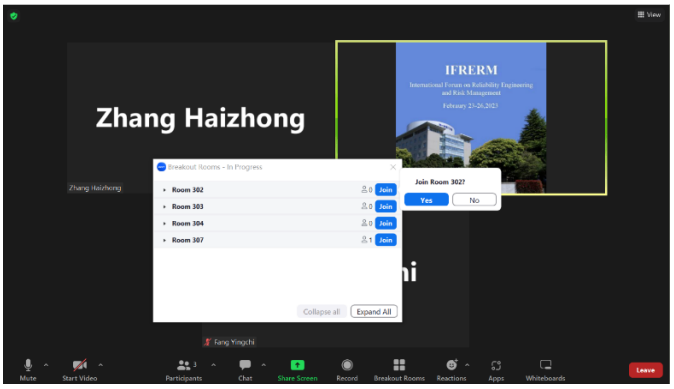
On site: Main venue: Room 307, Branch venue: Room 302, 303 and 304
Building 3, Kanagawa University
[Address] 3-27-1 Rokkakubashi, Kanagawa-ku. Yokohama- shi, Kanagawa, 221-8686, Japan
[Tel] +81-45-481-5661 (Operator)
[Web] https://www.kanagawa-u.ac.jp/english/

Online: Zoom
Zoom ID: 312 655 4388 Password: lab1232

Note:

1. Entering the online meeting is permissible 5 minutes before the onsite.
2. To join in the ceremony, lectures and closing address online, please enter the Zoom meeting ID and Password.
3. To join in the Room, following steps are required:

start the "zoom" software/app → enter the meeting room by inputting the ID and Password → click "Breakout Rooms" [*Button*] → choose the Room of interest with "join" [*Button*]



Contact information

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Accommodation

Yokohama Tokyu REI Hotel
[Address] 4-3-6, Minatomirai, Nishi-ku, Yokohama-shi, Kanagawa 220-0012, Japan
[Tel] +81-45-663-0109
[Web] https://www.tokyuhotelsjapan.com/global/yokohama-r/index.html

Transportation

Access from Haneda airport to hotel:

Haneda airport		Yokohama Station		New Takashima
Platform 2 Airport line (Express) Kanazawa Bunko direction	30min →	Platform 1 Minatomirai Line (Each stop) Motomachi/Chinatown direction	2min →	Exit 2

羽田空港		横浜駅		新高島
2番ホーム 空港線 (急行) 金沢文庫行	30min →	1番ホーム みなとみらい線 (各停) 元町・中華街行	2min →	2出口

Note: Please gather at the hotel lobby at 17:30 on the 23rd, and we will arrange a reception banquet.

Access from hotel to forum venue:

We will arrange for a round-trip taxi between the hotel and the Forum venue. Please gather in the hotel lobby by 8:00 on the 24th, and a conference assistant will pick you up at the hotel lobby. Please make sure that you will be able to gather at the specified time.