Programme

5th International Symposium on Frontiers of Road and Airport Engineering

July 12-14, 2021

Delft University of Technology

(GMT Time Schedule)
Dear Colleagues,

It is our pleasure to welcome you to the 5th International Symposium on Frontiers of Road and Airport Engineering (IFRAE 2021), in Delft, the Netherlands, on July 12 – July 14, 2021.

The IFRAE 2021 aims to provide a forum and platform for researchers, practitioners, and administrators a unique and rewarding opportunity to present and forward new materials and innovative technologies for achieving sustainable and renewable pavement materials and design methods.

The Chairs would like to thank all the contributors for submitting high-quality scientific articles. All submitted research articles went through an extensive and detailed peer-review process conducted by at least three members of the Scientific Committee, Young Committee and finally by the Editors. Based on their recommendations, 128 contributions, originating from 14 different countries, were chosen for presentation and inclusion in the Proceedings.

The Chairs would like to thank the Standing International Advisory Committee for proving valuable advices and support, the members of the Scientific Committee and Young Committee who took the responsibility of reviewing the manuscripts and ensuring the excellent quality of the accepted papers. The Chairs would also like to take this opportunity to thank all the Organizing Committee members, co-organizers and sponsors and in particular Tongji University, Dutch Ministry of Infrastructure and Water Management (RWS); Research Institute Of Highway Ministry Of Transport (RIOH) China; and Wuhan University of Technology (WUT) for their active participation in the whole process and making the event successful.

In addition to the core Symposium activities, Workshop sessions will be held which will be focused on the recent developments of the tools and methods to assess different aspects of sustainable pavement materials.

We hope that the IFRAE 2021 will serve as a platform for the development of modern pavement design methodologies in which innovative materials, advanced mechanical characterization techniques, and new design methods for sustainable pavement materials shall constitute the backbone of the pavement design process.

We are looking forward to (virtually) meeting you in July.

The Co-Chairs:

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Delft University of Technology
The Netherlands

Xueyan Liu
Delft University of Technology
The Netherlands

Lijun Sun
Tongji University
China

Jianming Ling
Tongji University
China

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Delft University of Technology
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Professor Sandra Erkens holds the Chair of Pavement Engineering Practice, at Delft University of Technology in the Netherlands and is the head of the Pavement Engineering group at this University. Besides this, she is the principal specialist in pavement materials and structures at Rijkswaterstaat, the Dutch highway authority. Sandra obtained her PhD and MSc in Civil Engineering at the Delft University of technology.

She is an internationally acknowledged expert in pavement materials and structures in general and asphalt concrete in particular. She is a member of national and international groups involved in developing technical requirements for pavement materials and in several (inter)national organizations for the dissemination of research. These include the ISAP technical committee on Constitutive Modelling of Asphalt Concrete, the organization committee of the two yearly Dutch conference on Infrastructure (CROW-infradagen) and the organizing committee of the 5th International Symposium on Frontiers of Road and Airport Engineering (IFRAE), of which she is one of the chairs. She has been involved in road engineering research since 1997, has published over a hundred papers and journal articles on her work and is a regular reviewer for conferences and journals on the topic.

Prof. Erkens has considerable experience coordinating the cooperation of research organizations, among others as a member of the FEHRL (Forum for European Highway Research Laboratories) executive committee and as Program Team member for InfraQuest, the cooperation between Rijkswaterstaat, TU Delft and TNO building in the Netherlands. She is also one of the founding members and an officer of APSE, the Academy of Pavement Science and Engineering and their past secretary general.

Dr. Liu is currently an associate Professor in the Section of Pavement Engineering of the Faculty of Civil Engineering & Geosciences of TU Delft. He works in the areas of constitutive modelling, numerical modelling and material experimental characterization. Within the research program of the Section Pavement Engineering, his research topics mostly relate to the development and implementation of constitutive models for the simulation of the static and dynamic response of various pavement engineering materials like soils, asphalt concrete, liner and reinforcing systems etc. and sustainable development technologies, i.e., multiscale modelling of asphaltic materials, warm/cold asphalt concrete technology, durability of asphalt surfacings on orthotropic steel deck bridge, accelerated pavement test, pavement continuous monitoring and sustainable development technologies. Dr. Liu was granted his doctoral thesis in 2003. During the same period, Dr. Liu participated also in the team that developed the ACRE model for Asphalt Concrete Response currently implemented in 3D Computer Aided Pavement Analysis system (CAPA-3D). Dr. Liu has published more than 100 technical and journal papers on the mechanics and the finite element modelling of granular, concrete and asphaltic materials. Dr. Liu is a member of RILEM Technical Committee 272-PIM Phase and Interphase behaviour of Bituminous Materials and a member of Delft Centre for Materials (DCMat). He is also a member of ISAP, AAPT, APSE and IACMAG. Dr. Liu is an Editorial Board Member of Geomaterials (GM). Dr. Liu was appointed
as Board member of the International Association of Chinese Infrastructure Professionals (IACIP) and member of the Academic Committee of the Key Laboratory of Road Structure and Materials Transportation Industry of the China Ministry of Transport. He is also actively involved in organizing inter/national workshops and conferences and was invited as Scientific/Technical committee member of several international conferences.

Professor Lijun Sun received his Ph.D. degree in 1989. Since 1993, he has been a professor in the Department of Road and Traffic Engineering, and a CKSP professor in the College of Transportation Engineering at Tongji University since 1998, vice director of Academic Committee of Tongji University since 2021. He is the dean of Advanced Institute of Intelligent Transportation Studies and director of Road and Traffic Institute. He received the National Outstanding Youth Research Found in 2003. He is a member of Expert Committee of China Ministry of Transportation, and a member of the council of China Highway Society, China Civil Engineering Society, and China Intelligent Transportation System Society. His research interests focus on pavement structure, material, and pavement nondestructive evaluation, performance, preventative maintenance management, and pavement recycling, as well as intelligent transportation management. He establishes the behavior mechanics for asphalt pavement, the first pavement management system of China, and the first intelligent traffic guidance system of China. His research results have been incorporated in the specifications of the China Ministry of Transportation, China Ministry of Construction, and China Bureau of Civil Aviation for pavement design, evaluation, and maintenance. He has published more than 600 technical papers, 13 books in his research fields, and won 3 National Prizes of Science and Technology Progress Awards and 35 provincial-level Science and Technology Progress Awards. He is the chief writer of China Specifications of Airport Paving Design, and one of the main writers of China Specifications of Asphalt Pavement Design.

Professor Jianming Ling is a professor in road and airport engineering and the dean of College of Transportation Engineering, Tongji University. He is the director of Key Laboratory of Infrastructure Durability and Operation Safety in Airfield of CAAC, and the director of Key Laboratory of Road and Traffic Engineering of the Ministry of Education, China. He is also an executive editor-in-chief of "Frontiers of Structural and Civil Engineering." and associate editor-in-chief of "International Journal of Transportation Science and Technology". Prof. Ling received his Ph.D. degree in civil engineering from Tongji University in 1993. His primary research interests are Subgrade Design Theories and Technologies, Airport Infrastructure Design, and Management. In the past two decades, Prof. Ling led the research projects on dynamic behavior and design index of sub-grade for MEPDG in China. He also developed the first management system for airport pavement (CAPMS) in China, and a pavement design method for New General Large Air-crafts. Prof. Ling won the second prize of the National Science and Technology Progress Award four times. He was the chief editor of "Code for Design of Urban Road Subgrades", and "Technical Specifications of Airport Pavement Evaluation and Management" of China.
Dr. Kumar Anupam is an assistant professor in the Section of Pavement Engineering, Department of Civil Engineering and Geosciences, Delft University of Technology, the Netherlands. He is actively involved in teaching courses such as Micromechanical modelling of AC, Continuum Mechanics and Pavement Construction and Maintenance. His research activities are related but not limited to performance-based big-data analytics; tire-pavement interactions and micromechanical modelling of AC. He has been involved in several international projects which include FP7 EU projects and projects in the middle east. In national projects, he works in close cooperation with the Rijkswaterstraat, the Netherlands. He is a co-editor of Functional Pavement Design IV: Proceedings of the 4th Chinese - European Workshop on Functional pavement Design, CRC Press and Advances in Materials and Pavement Prediction: Papers from the International, CRC Press. He is an active member of the ISAP, TRB, APSE, iSMARTi and serves on the editorial board member of IJPE. Dr. Anupam holds a Bachelor's degree from Indian Institute of Technology-Roorkee, India and PhD degree from National University of Singapore, Singapore.
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The Swedish National Road and Transport Research Institute, Sweden
KEYNOTE SPEAKERS:

Hussain U. Bahia, Ph.D.
Distinguished Professor and Director of the Modified Asphalt Research Center (MARC) The University of Wisconsin-Madison, USA

Topic: Towards More Recycling of Asphalt Pavements—Opportunities and Challenges

Professor Bahia completed his PhD at the Pennsylvania State University in 1991 and participated in the SHRP research as a leading researcher on asphalt binders. He is currently a full professor in the department of Civil and Environmental Engineering at which he teaches and conducts research on pavement materials and design.

He served as the Director of Research and Technical Services of the Asphalt Institute-USA in 1995 and joined the University of Wisconsin on permanent basis in 1996. He served as the Technical Director of the Wisconsin Highway Research Program from 2005 until 2012 and established the Modified Asphalt Research Center (MARC) in 2009 for which he serves as the Director. He has published more than 200 technical papers in refereed journals and has graduated more than 75 MS and Ph.D. students, and supervised 10 post-doctoral fellows at UW-Madison.

He is one of the Founders of the Middle East Society of Asphalt Technologists (MESAT) and served as the Leading Pavement Expert for the Public Work Authority in Qatar 2013-2016. He provides consulting services for many companies and road agencies in the USA, South America, Africa, and the Middle East.
Lijun Sun, Ph.D.
CKSP Professor
College of Transportation Engineering
Tongji University, China

Topic: Accurate Model and Parameter System for Structural Response Analysis of Asphalt Pavement

Professor Lijun Sun received his Ph.D. degree in 1989. Since 1993, he has been a professor in the Department of Road and Traffic Engineering, and a CKSP professor in the College of Transportation Engineering at Tongji University since 1998, vice director of Academic Committee of Tongji University since 2021. He is the dean of Advanced Institute of Intelligent Transportation Studies and director of Road and Traffic Institute. He received the National Outstanding Youth Research Found in 2003. He is a member of Expert Committee of China Ministry of Transportation, and a member of the council of China Highway Society, China Civil Engineering Society, and China Intelligent Transportation System Society. His research interests focus on pavement structure, material, and pavement nondestructive evaluation, performance, preventative maintenance management, and pavement recycling, as well as intelligent transportation management. He establishes the behavior mechanics for asphalt pavement, the first pavement management system of China, and the first intelligent traffic guidance system of China. His research results have been incorporated in the specifications of the China Ministry of Transportation, China Ministry of Construction, and China Bureau of Civil Aviation for pavement design, evaluation, and maintenance. He has published more than 600 technical papers, 13 books in his research fields, and won 3 National Prizes of Science and Technology Progress Awards and 35 provincial-level Science and Technology Progress Awards. He is the chief writer of China Specifications of Airport Paving Design, and one of the main writers of China Specifications of Asphalt Pavement Design.

Baoshan Huang, Ph.D.
Edwin G. Burdette Professor
Department of Civil and Environmental Engineering
University of Tennessee, USA

Topic: Recycling Efficiency for Hot-in-Place Recycling of Asphalt Pavements

Prof. dr. Baoshan Huang is a scholar in civil infrastructure engineering and a civil engineering practitioner in pavement and geotechnical engineering. He received his Ph.D. degree in civil engineering from the Louisiana State University, his M.S. and B.S. degrees from Tongji University in Shanghai, China. His professional career includes over 30 years of experience in transportation and geotechnical engineering with academia, industry and government agencies. Dr. Huang has published over 220 peer reviewed journal papers that have received over 6300 Web of Science citations. He has been awarded four US patents as the primary inventor and has two additional pending patents.
Louay N. Mohammad, Ph.D., P.E. (WY), Fellow-ASCE
Irma-Louise Rush Stewart Professor
Department of Civil and Environmental Engineering
Louisiana State University, USA
Topic: Increased RAP Contents in Asphalt Mixtures: Fundamental Assessments

Dr. Mohammad is a professor of Civil and Environmental Engineering and holder of the Irma Louise Rush Stewart Endowed Professorship and Transportation Faculty Group Coordinator at Louisiana State University. He is also an award-winning professional engineer, a Transportation Research Board Emeritus member, and an elected fellow of the American Society of Civil Engineers (ASCE). Dr. Mohammad serves as the director of the Engineering Materials Characterization and Research Facility at the Louisiana Transportation Research Center (LTRC). Dr. Mohammad teaches and conducts research in the areas of highway construction materials, pavement engineering, accelerated pavement testing, advanced materials characterization and modeling, and infrastructure resiliency and sustainability. His research has resulted in numerous awards and revisions to the Louisiana Department of Transportation and Development’s (LADOTD’s) specifications for Roads and Bridges and has been adopted in the engineering state-of-practices throughout the nation. His work in the field of sustainability has also created local and national ripple effects as he introduced and developed test methods showcasing how to recycle waste tires into Louisiana roads without sacrificing performance quality. With over 30 years of research in his resume, Dr. Mohammad has authored and co-authored over 430 technical publications in pavement engineering, including 223 refereed journal articles, 66 refereed proceedings papers, 64 technical reports, 1 book, 3 edited books, and 10 invited articles in technical magazines. Dr. Mohammad has been recognized for his ongoing contributions to his field of asphalt research as well as his academic impacts. He won the 2018 AAPT Walter J. Emmons Award for A Paper of Outstanding Merit. Dr. Mohammad he has been awarded the 2013 Best Paper Award of the 8th International Conference on Road and Airfield Pavement Technology; 2010 Distinguished Research Paper of the Journal of Engineering Research; the 2009, 2012, and 2015 Asphalt Rubber Ambassador Award; 2002 AAPT Board of Directors Award of Recognition; and the 1999 ASCE Bituminous Materials Committee Outstanding Service and Leadership award.
Lily Poulikakos, Ph.D
Senior Scientist
Empa - Swiss Federal
Laboratories for Materials, Switzerland

Topic: On the use of waste and marginal materials for sustainable roads

Lily Poulikakos received her B.S in architectural engineering from the university of Colorado, Boulder USA, M.S. in civil engineering from university of Illinois USA and PhD in civil engineering from ETH Zurich, Switzerland. She is currently a senior scientist at Empa, the Swiss federal laboratories for materials science and technology. Her research focus is on using multi scale characterization methods to study innovative bituminous materials chemically and mechanically. She is a leading member of Rilem as former deputy chair of the technical committee TC-231 NBM on nano bituminous materials and TC-252 CMB chemo mechanical characterization of bituminous materials and currently chair of TC-279 WMR on waste and marginal materials for roads. Dr. Poulikakos is the author of over 100 publications in peer reviewed journals and editor of Elsevier journal Construction and Building Materials CBM.

Hongduo Zhao, Ph.D.
Professor
College of Transportation Engineering
Tongji University, China

Topic: The Framework and Case Studies of Smart Runway

Dr. Hongduo Zhao is a professor in airport and road infrastructure at Tongji University. He is the vice dean of The Key Laboratory of Infrastructure Durability and Operation Safety in Airfield of CAAC. He has got his PhD degree at Tongji University in 2007. Zhao has been working in UC Davis during 2009 to 2010, and in Georgia Tech in 2018 as a visiting scholar. His research area is about smart road and airport pavement, including condition monitoring, energy harvesting and precast method of smart pavement. Zhao has led more than 20 research projects funded by NSFC, STCSM, MOE, and CCCC. He is one of the founders of “International Consortium for Smart Road Innovation (ICSRI)”.
SESSION MODERATORS:

Keynote Session Moderator: Prof. Tom Scarpas, Khalifa University and Delft University of Technology

Prof. A. (Tom) Skarpas is the Head of the Department of Civil Infrastructure and Environmental Engineering at Khalifa University, Abu Dhabi and the Chair of Pavement Engineering in the Pavement Engineering Section in the Faculty of Civil Engineering and Geosciences at Delft University of Technology, in the Netherlands. His research interests include constitutive modelling of pavement materials, pavement mechanics & design, chemo-mechanical modelling of ageing and healing in asphaltic materials, wheel-pavement interaction, modelling of moisture induced damage in asphalt mixtures, non-linear finite element analysis techniques and mechanics of multiphase media. Prof. Skarpas is the Editor-in-Chief of the International Journal of Pavement Engineering, the Chairman of the ISAP Technical Committee on Constitutive Modelling of Asphalitic Materials and has been the secretary of the RILEM Technical Committee on Cracking in Asphalt Pavements and the chairman of the FHWA Expert Task Group on Fundamental Properties and Advanced Modelling of Bituminous Materials. He is also a member of the APSE Board of Governors and a member of the MESAT Board of Directors. He is the recipient of an MTS Professorship from the University of Minnesota, and Adjunct Professorships from Harbin Institute of Technology and South East University in China, the IACMAG Excellence Award and an honorary member of the Italian Society of Infrastructural Engineering. He has organized numerous international Conferences, Workshops and Seminars.

Session 1, 4: Green and sustainable pavement materials

Moderators: Shifeng Wang Shanghai Jiao Tong University, Feipeng Xiao Tongji University

Dr. Wang is currently a Professor in the Department of Polymer Science and Engineering of Shanghai Jiao Tong University. His research interests focus on Polymer processing, Rubber and plastic recycling, and Polymer modified asphalt. He published over 170 papers and owned 28 patents. His innovations were mainly in the field of polymers for the road. Those innovations or products got awards from several organizations, such as the National Science and Technology Prize (Second level) by State Office of PRC (2012.10); Technology Innovation Prize by Shanghai City (2010.9); Science and Technology Prize by China Highway Society (2010.11), etc. He is a member of the following journals or societies: Journal of China Petroleum Asphalt; China Tyre Recycling Association; China Chemical Society; China Rubber Industry Association.
Prof. Xiao possesses an excellent record of education and academic & industrial experiences in the civil engineering field. He has more than 20-year work experience in structure design, geotechnical engineering, construction materials, and airport engineering, and obtained his professional engineer license in Maryland, UAS in 2008. He is currently working as a Professor and Department Chair at Road and Airport Engineering in Tongji University, China. Dr. Xiao was appointed for Editor of Journal of Construction and Building Materials, Associate Editor, and the Editorial Board Member of other four international well-known journals. Dr. Xiao has been widely recognized in pavement sustainable materials research including more than 180 peer-reviewed articles in national and international circulating journals and international conference proceedings. His publications are broadly cited by the researchers from all over the world and he has always been awarded as top cited researcher in China in “civil and structure engineering areas” since 2014. He is co-chair of highway department of World Transport Conversion (WTC), and a member of many national or international professional societies by nomination or election, such as Sigma Xi Research Society, American Society for Testing of Materials, American Nano Society, and Association of Asphalt Pavement Technologists.

Session 2.5: Recycling Technology

Moderators: Mingliang Li Research Institute of Highway Ministry of Transport, Gordon Airey The University of Nottingham

Dr. Mingliang Li, is a full-time associate researcher in Road Research Center, Research Institute of Highway Ministry of Transport (RIOH) in China. Dr. Li got his Ph. D degree in Road and Railway Engineering from Delft University of Technology, The Netherlands. His research interests are on functional pavement material and technology, noise-reducing pavement, asphalt materials, and recycling technology. He has participated in and completed more than 10 national and provincial scientific research projects, such as the National Key R & D plan of the Ministry of Science and Technology, Research projects from Ministry of Transport, etc. He was in charge of more than 30 design and consultant projects, including porous asphalt pavement, Sponge City permeable pavement and in-place recycling, etc. He has published one monograph, participated in the writing of six national and local standards, published more than 50 journal papers, and obtained 32 national patents.
Gordon Airey is Professor of Pavement Engineering Materials and Director of the Nottingham Transportation Engineering Centre (NTEC) at the University of Nottingham. He has served as a past Director on the Board of the International Society for Asphalt Pavements (ISAP) and has over 25 years research experience in pavement engineering. Gordon has authored and co-authored over 350 journal and conference publications as well as producing chapters for a number of highway and pavement engineering textbooks. His research interests include rheological characterization of bitumen, bitumen-filler mastics and asphalt mixtures; the durability of asphalt materials; the micro-structural characterization of asphalt mixtures; and the use of secondary materials, including crumb rubber and bio-binders. During his 20 years in academia, he has held positions of Research Scientist at Texas A&M University and Visiting Professor at the University of Illinois at Urbana-Champaign, while on sabbatical in 2006.

Session 3.6: Functional pavement design

Moderators: Zhen Leng Hong Kong Polytechnic University, Miomir Miljković University of Niš

Dr. Zhen Leng is an Associate Professor and the Director of the Road Research Laboratory at The Hong Kong Polytechnic University. He received his Bachelor and Master degrees from Southeast University in China, and PhD degree from University of Illinois at Urbana-Champaign in the US. His research interests mainly include sustainable pavement materials and technologies, and non-destructive evaluation of transportation infrastructure. He is currently the Vice President of Academy of Pavement Science and Engineering, the President-elect of the ASCE Greater China Section, an Executive Board Member of the Hong Kong Society for Transportation Studies (HKSTS), and an Executive Board Member of the International Association of Chinese Infrastructure Professionals (IACIP). He also serves as a Co-Editor-in-Chief of Journal of Cleaner Materials, an Executive Editor of Journal of Cleaner Production, an Associate Editor of ASCE Journal of Materials in Civil Engineering and ASCE Journal of Transportation Engineering, Part B: Pavements, and an Editorial Board Member of several other journals, such as Road Materials and Pavement Design, and Transportation Research Part D: Transport and Environment.
Dr.-Ing. Miomir Miljković is an Assistant Professor at the University of Niš. In 2008, he obtained a master’s degree at the University of Niš as the best graduated student of that academic year of the faculty. From 2009 to 2012 he was a research associate at the same university, and from 2012 to 2014 at Ruhr-Universität Bochum. In 2014, he graduated as a Doctor of Engineering at Ruhr-Universität Bochum. From 2017 to 2018 was a postdoctoral researcher at Empa. The main domain of his research is sustainable asphalt pavement engineering primarily considering advanced aspects of rheomechanical and physicochemical behaviour of bitumen-based materials (especially sub-mortar phases) including polymer-modified bitumen, ageing, and rejuvenation. He also works on multiphase model systems of bitumen emulsion-based composites and their non-destructive characterisation (X-ray and neutron tomography). Dr.-Ing. Miljković is an active member of few RILEM technical committees, the leader of Task Group 1 of TC 280-CBE (Multiphase Characterisation of Cold Bitumen Emulsion Materials), and a member of FGSV and APSE. He published several tens of scientific articles and participates in the editorial boards of International Journal of Pavement Engineering, Proceedings of the ICE: Transport and Construction Materials. He reviewed almost four hundred manuscripts in many scientific journals and was an invited scientific committee member in several international conferences.

Session 7, 10: Warm & cold mix asphalt materials

Moderators: Yuhong Wang Hong Kong Polytechnic University, Evangelos Manthos Aristotle University of Thessaloniki

Dr. Yuhong Wang is a professor in the Department of Civil and Environmental Engineering at the Hong Kong Polytechnic University. He graduated from Tongji University in Shanghai, China with a bachelor's degree and obtained his master’s and Ph.D. degree from University of Kentucky. He successively worked at the Kentucky Transportation Research Center as a research engineer, Lawrence Technological University as a tenure-track assistant professor, and East Carolina University as a tenure-track assistant professor. He started his employment at the Hong Kong Polytechnic University as an assistant professor in 2010. Prof. Wang's main research areas include pavement engineering and infrastructure management. Prof. Wang has led and participated in more than 50 scientific research projects in the United States and Hong Kong and published more than 100 papers and books. He also holds leadership positions in various academic and professional bodies and serves as the editor of several internationally renowned journals. He was a registered professional engineer in the United States.

Currently, Prof. Wang’s main research projects and interests are future urban green and intelligent infrastructures, aiming to make our cities cleaner, smarter, more resilient, and more environmentally friendly. He is leading two major research projects in these areas. One is the "Urban Nature Laboratory (UNaLab)" research project jointly funded by European Commission and Research Grant Council (RGC) of Hong Kong. The other is “New prefabricated composite
pavement systems for sustainable and smart-city development,” funded by Research Impact Fund (RIF) of Hong Kong RGC.

Dr. Evangelos Manthos is a Civil Engineer, Assistant Professor in Aristotle University of Thessaloniki (A.U.Th), Greece specialized in Highway engineering and Highway engineering materials and Testing. He has published several papers in Scientific Journals and peer reviewed International Conferences. In his ten years of service in A.U.Th, he has supervised more than thirty final year theses in undergraduate and postgraduate level. He has been a member of Organizing and Scientific Committees of International Conferences, Seminars and Symposiums and is an ad-hoc reviewer for several scientific journals.

Session 8,11: Pavement preservation, maintenance and rehabilitation

Moderators: Dawei Wang Harbin Institute of Technology, Zhanping You Michigan Technological University

Univ. Prof. Dr.-Ing. habil. Dawei Wang. Professor of the School of Transportation Science and Engineering at Harbin Institute of Technology. He graduated from Department of Civil Engineering in Tsinghua University in 2003. In 2007 and 2011 he received his Diploma's and Doctor’s degree in RWTH Aachen University, respectively. In 2017, he was granted Habilitation based on the research and effort he contributed to highway engineering in Germany. His research interests and expertise focus primarily on asphalt pavement skid resistance, multi-scale characterization of the asphalt pavement mechanical behavior and functional pavement theory and technology. So far, he has directed or participated in more than 24 government-aided scientific research projects. He published nearly 150 academic publications and serves on the editorial boards of many international academic journals.
Dr. Zhanping You earned his PhD in Civil Engineering from the University of Illinois at Urbana-Champaign in 2003. He is a Distinguished Professor in the Department of Civil and Environmental Engineering at Michigan Technological University. Dr. You has completed research projects related to road materials, pavement engineering, and sustainable building materials. He has led research projects from engineering practice of roads to pavement science with funding from federal, state, and local agencies. Dr. You has received numerous recognitions. He was awarded U.S. Department of Transportation’s Dwight David Eisenhower Transportation Fellowship in 2001. In both 2004 and 2005, he was awarded the Dwight David Eisenhower Transportation Faculty Fellowship. He earned the prestigious Michigan Tech Research Award in 2019 and University Distinguished Professorship. He was named as Fellow of ASCE in 2020, Fellow of ASCE’s EMI in 2021 and Fellow of the International Association of Advanced Materials in 2020. Dr. You served as the Chair to ASCE Engineering Mechanics Institute’s Pavements Committee and CI’s Bituminous Materials Committee. He is also the guest editor for other journals outside of ASCE.

Session 9,12: Smart pavement materials and structures

Moderators: Xue Luo Zhejiang University, Yuqing Zhang Aston University

Dr. Xue Luo is a professor in highway engineering at the College of Civil Engineering and Architecture of Zhejiang University, China. She was an associate research scientist at Texas A&M Transportation Institute before. Her current work covers the research and teaching of pavement engineering, including pavement material mechanics, pavement structural analysis and performance predictions, as well as the non-destructive evaluation and intelligent analysis of pavement performance. Dr. Luo is now leading a national key R&D project of China and a natural science foundation project of Zhejiang Province. She has successfully completed over 10 research projects funded by NCHRP or TxDOT as a principal investigator or researcher. Dr. Luo’s research has resulted in over 70 journal or conference papers. Dr. Luo serves as an associate editor or guest editor for multiple SCI-indexed academic journals. She is also an expert referee for the national science foundation as well as over 20 international renowned journals.
Dr Yuqing Zhang is a senior lecturer (associate professor) in highway engineering and the Director of the Aston Institute of Materials Research (AIMR) at Aston University in Birmingham, UK. His research is focused on mechanics-based multiscale and multiphysics modelling of pavement materials and structures, renewable materials for sustainable roads and intelligent technologies for future city infrastructures. Leading as a principal investigator, Dr Zhang has secured research projects from European Horizon 2020, Royal Society, Royal Academy of Engineering, British Academy and asphalt industries for over £1 million in the past 4 years. Dr Zhang now serves on the steering committee of the UK’s National Asphalt Research Consortium (NARC) and is an active member on ISAP, TRB, EATA and RILEM technical committees. He also serves as an associate or guest editors for 3 technical journals, a reviewer for 38 academic journals and a referee for 6 European countries’ national research councils. Dr Zhang is the recipient of Theodore von Kármán Fellowship from RWTH Aachen University, Germany.

Session 13,16: Eco-efficiency pavement materials

Moderators: Tao Ma Southeast University : Pengfei Liu RWTH Aachen University

Tao Ma, Professor, Doctoral Student Advisor, Young Chief Professor of Southeast University, the Deputy Dean of the School of Transportation & the Chair of the Road Engineering Department of Southeast University, National Excellent Young Scholars. Dr. Ma is currently serving as the deputy director of the National Experimental Teaching Center of Road Traffic Engineering, the deputy director of the National Experimental Teaching Center of Virtual Simulation of Road Traffic Engineering, the deputy director of the National Engineering Laboratory for Advanced Road Materials, and the director of Jiangsu Key Laboratory for Long-term Service and Safety of Road Infrastructure. Dr. Ma was selected for the 333 High Level Talents Cultivating Program, Six Summit Programs for Talents, and Innovative & Entrepreneurial Talent Program of Jiangsu Province. Dr. Ma was awarded the Southeast University Youth Award, National Youth Award of Road Science and Technology, and honored as one of the Leading Talents in Science and Innovation Technology in Transportation Industry by the Ministry of Transport. Dr. Ma has been undertaking long-term teaching as well as research pertaining to road subgrade and pavement engineering. Dr. Ma was the principle investigator or core contributor in over 30 essential research projects funded by the National Key Research and Development Program of China, National Key Science and Technology Support Program, National Nature Science Foundation of China, etc. Dr. Ma has published five books and textbooks, over 80 SCI indexed journal articles as the first or corresponding author, and has been granted over 40 patents. Dr. Ma has been awarded over 10 provincial and ministerial level awards, including First Place of the Technical Invention by Ministry of Education, First Place of the Provincial Prize for Progress in Science and Technology of Hubei Province, Second Place of the Provincial Prize for Progress in Science and Technology of Jiangsu Province, etc. In addition, he has earned five provincial and ministerial level teaching awards, including First Place of the National Universities Micro-Teaching Competition, First Place of the Achievements of Jiangsu
Dr. Pengfei Liu is a senior research engineer and the leader of the research group “Simulation and Mechanics of Pavement Materials” in the Institute of Highway Engineering (ISAC), RWTH Aachen University. He is also the general manager in Sino-European Research Center for Advanced Transportation Infrastructure Technology GmbH. He received his bachelor degree from University of Science and Technology Beijing (USTB) in 2008. Afterward, Dr. Liu received his master and doctoral degree from RWTH Aachen University in 2012 and 2017, respectively. His main research areas can be summarized as numerical methods applied in asphalt pavement, multiscale modelling and characterization of asphalt mixtures. He makes fundamental contributions to the application and realization of national and international scientific research projects in ISAC and has published more than 80 publications consisting of 74 SCI papers as well as 4 books. He also serves as an academic/topic editor for 4 technical journals and a reviewer for 42 SCI journals. Dr. Liu has been recognized with the 2017 Excellent Self-Funded Student Scholarship of the Ministry of Education P. R. China.

Session 14,17: Mechanical characterization and Safety technology for smart roads

Moderators: Yue Xiao Wuhan University of Technology, : Katerina Varveri Delft university of Technical University

Yue Xiao is a full time Professor from State Key Lab of Silicate Materials for Architectures in Wuhan University of Technology. He is now serving as Direct in the Sub-lab of Construction Materials Recycling in the State Key Laboratory. He has been awarded as Fok Ying Tung Outstanding Young Teacher by the Ministry of Education of China in 2018. He received the title of CHUTIAN Scholar in material science and engineering from Hubei provincial department of education in 2014. Dr. Xiao received his PhD degree in Road and Railway Engineering, at Delft University of Technology, with the supervisor of Prof. A.A.A. Molenaar. His research interests include eco-efficient pavement materials and construction materials recycling. He has published 74 peer-reviewed SCI journal papers and other 9 high quality Chinese journal papers. His Google citation is more than 1500, with the H-index of 21.
Dr. Aikaterini Varveri is an Assistant Professor of Future Pavement Materials at the section of Pavement Engineering at Delft University of Technology. Her research mainly focuses on the areas of advance characterization and modelling of physicochemical induced damage processes (moisture damage, oxidative ageing and freeze-thaw) that affect the durability of (porous) asphalt pavements. Currently, she is working on establishing a relationship between the chemo-rheological properties and the mechanical properties of bituminous materials, and in what way this can change under complex and interacting environmental conditions. She also participates as work package leader and project manager in national and international research projects (funded by RWS, NWO, CEDR, Wetterskip Fryslân) aimed to improve the performance and durability of bituminous materials and asphalt pavements, while minimizing their impact on the environment.

Aikaterini is the Research Coordinator for the Netherlands in the European National Highway Research Laboratories (FEHRL) group. She is a member of the International Society for Asphalt Pavements (ISAP) and she also serves as a Deputy Chair in the RILEM Technical Committee on fingerprinting of bituminous binders.

Session 15,18: Pavement monitoring and big data analysis

Moderators: Xingyi Zhu Tongji University, Eyal Levenberg Technical University of Denmark

Prof. Xingyi Zhu is a professor of College of Transportation Engineering in Tongji University. She graduated from Zhejiang University and holds a degree in Structural Engineering. She has rich experience in the research of smart pavement materials, multi-scale modelling, as well as road-tyre interaction. She is currently serving as an advisor to the Airport Operations Working Group of International Civil Aviation Organization (AOWG-FTF), the chairperson of the Asphalt and Other Cement Technical Committee of the Road Division of the World Transport Congress, and the associate editor of Journal of Materials in Civil Engineering (SCI-Q2). As a guest editor of Journal of Materials in Civil Engineering, she organized a special issue "Smart Paving and Infrastructure Materials for Longer Service Life".

Prof. Zhu presided over more than 20 projects, including 4 National Natural Science Foundations of China (NSFC), 1 Special topics of national key R&D program, China-Sweden International Cooperation and Exchange Project and the NSFC Outstanding Youth Foundation. As a core member, Prof. Zhu participated in the National Program on Key Basic Research Project of China (973 Program) and the National Key Research and Development Plan. She has published more than 90 academic papers, and was selected as one of the top 2% of the world’s top scientists and Elsevier's Chinese Most Cited Researchers. She has 16 patents and 2 soft works, participated in the compilation of 4 industry and local standards, and reviewed 2 industry standards. Her research results won the first prize of Shanghai Science and Technology Progress Award, the first prize of Science and Technology Progress Award of China Highway Society, the second prize of China Industry-University-Research Cooperation Innovation Achievement Award, and the second prize of Science and Technology Progress Award of Yunnan Highway Society.
Eyal has been involved in pavement engineering for nearly 30 years, of which six years as an air-force engineer and nearly 20 years a self-employed pavement consultant. Eyal holds a Ph.D. in Civil Engineering from the Technion-IIT, and is currently an Associate Professor of Civil Engineering at DTU. His research centers around pavement mechanics, with particular focus on the advanced interpretation of sensor readings for condition assessment of pavement systems. Thus far, Eyal has authored or co-authored about 100 scientific publications; his lecture notes on pavement mechanics were recently published on Amazon.
# IFRAE 2021 - Short Programme

<table>
<thead>
<tr>
<th>GMT</th>
<th>TRACK 1</th>
<th>TRACK 2</th>
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<tbody>
<tr>
<td></td>
<td><strong>MONDAY (JULY 12), Day 1</strong></td>
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<tr>
<td>09:00-09:20</td>
<td>Opening session</td>
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<td><strong>Moderator: Prof. Sandra Erkens, Delft University of Technology</strong></td>
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<td>09:25-11:45</td>
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<td><strong>Session number: 2</strong></td>
<td><strong>Session number: 3</strong></td>
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<td>Green and sustainable pavement materials – Part 1</td>
<td>Recycling technology – Part 1</td>
<td>Functional pavement design – Part 1</td>
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<td><strong>Moderator: Shifeng Wang</strong></td>
<td><strong>Moderator: Mingliang Li</strong></td>
<td><strong>Moderator: Zhen Leng</strong></td>
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<td>Shanghai Jiao Tong University</td>
<td>Shanghai Jiao Tong University Ministry of Transport</td>
<td>Hong Kong Polytechnic University</td>
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<tr>
<td>11:50-13:00</td>
<td>Keynote Speech: Prof. Hussain Bahia, University of Wisconsin-Madison</td>
<td>Keynote Speech: Prof. Lijun Sun, Tongji University</td>
<td><strong>Moderator: Prof. Sandra Erkens, Delft University of Technology</strong></td>
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<td><strong>Session number: 5</strong></td>
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<td>Green and sustainable pavement materials – Part 2</td>
<td>Recycling technology – Part 2</td>
<td>Functional pavement design – Part 2</td>
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<td><strong>Moderator: Feipeng Xiao</strong></td>
<td><strong>Moderator: Gordon Airey</strong></td>
<td><strong>Moderator: Miomir Miljković</strong></td>
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<td>Tongji University</td>
<td>The University of Nottingham</td>
<td>University of Niš</td>
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<td><a href="mailto:fpxiao@tongji.edu.cn">fpxiao@tongji.edu.cn</a></td>
<td><a href="mailto:gordon.airey@nottingham.ac.uk">gordon.airey@nottingham.ac.uk</a></td>
<td><a href="mailto:miomir.miljkovic@outlook.com">miomir.miljkovic@outlook.com</a></td>
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<tr>
<td>11:50-13:00</td>
<td>Keynote Speech: Prof. Baoshan Huang, University of Tennessee</td>
<td>Keynote Speech: Prof. Louay Mohammad, Louisiana State University</td>
<td><strong>Moderator: Prof. Tom Scarpas, Khalifa University</strong></td>
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<td>Warm &amp; cold mix asphalt materials – Part 1</td>
<td>Pavement preservation, maintenance and rehabilitation – Part 1</td>
<td>Smart pavement materials and structures – Part 1</td>
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<td><strong>Moderator: Yuhong Wang</strong></td>
<td><strong>Moderator: Dawei Wang</strong></td>
<td><strong>Moderator: Xue Luo</strong></td>
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<td>Zhejiang University</td>
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<td><a href="mailto:dawei.wang@hit.edu.cn">dawei.wang@hit.edu.cn</a></td>
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<td>Keynote Speech: Dr. Lily Poulikakos, Empa</td>
<td>Keynote Speech: Prof. Hongduo Zhao, Tongji University</td>
<td><strong>Moderator: Dr. Xueyan Liu, Delft University of Technology</strong></td>
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<td><strong>Moderator: Evangelos Manthos</strong></td>
<td><strong>Moderator: Zhanping You</strong></td>
<td><strong>Moderator: Yuqing Zhang</strong></td>
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<td>Michigan Technological University</td>
<td>Aston University</td>
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<td><a href="mailto:emanthos@civil.auth.gr">emanthos@civil.auth.gr</a></td>
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<td><a href="mailto:y.zhang10@aston.ac.uk">y.zhang10@aston.ac.uk</a></td>
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<td>Mechanical characterization</td>
<td>Pavement monitoring and big data analysis – Part 1</td>
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<td><strong>Moderator: Tao Ma</strong></td>
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<td>Safety technology for smart roads</td>
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<td><strong>Moderator: Pengfei Liu</strong></td>
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<td><strong>Moderator: Katerina Varveri</strong></td>
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<td><strong>Moderator: Eyal Levenberg</strong></td>
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<td>09:25-12:25 (GMT)</td>
<td>Organizer: Prof. X. Zhu and Prof. Denis Jelagin</td>
<td>Organizer: Prof. A. C. Falchetto &amp; Dr. D. Wang</td>
<td>Organizer: Dr. Yuchen Wang</td>
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<tr>
<th>Time</th>
<th>Workshop 4: Changes in binder properties and the role of additives</th>
<th>Workshop 5*: Smart pavement – vehicle monitoring, tools and technics for functional pavement.</th>
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<tbody>
<tr>
<td>12:30-15:30 (GMT)</td>
<td>Organizer: Dr. S.N. Nahar &amp; Dr. X. Liu</td>
<td>Organizer: Dr. A. Kumar &amp; Dr. H. Wang</td>
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**IMPORTANT NOTES:**

- **All times are in GMT time**; please adjust it to your local time zone accordingly.
- Links to Track Sessions will be provided via email to all registered participants each day before start.
- Some Track Sessions may include extended discussion/roundtables immediately after the last presentation and Q&A; these discussions may continue beyond the session end time.
- * This workshop will be held on Sunday (11th July) from 12:30 to 15:30 (GMT time).
### IFRAE 2021- Detail Programme

<table>
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<tr>
<td>09:00-09:20</td>
<td>MONDAY (JULY 12) Day 1 Opening session</td>
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<td>Moderator: Prof. Sandra Erkens, Delft University of Technology</td>
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<td>09:25-11:45</td>
<td>MONDAY (JULY 12) Day 1 Session number: 1</td>
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<td>Green and sustainable pavement materials – Part 1</td>
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<td>Moderator: Shifeng Wang</td>
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<td>Shanghai Jiao Tong University <a href="mailto:shfwang@sjtu.edu.cn">shfwang@sjtu.edu.cn</a></td>
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- Mix design of base course of high ratio content iron tailings sand recycled mixture
  
  *(Y. Dong, H. Zhang, Y. Dong, Y. Hou & J. Tian)*

- Evaluation of asphalt binder anti-aging performance based on rheological and chemical properties
  
  *(M. Guo, M. Liang, Y. Fu & H. Liu)*

- Utilisation of recycle concrete aggregate in bituminous paving mixes: an economic evaluation

  *(J. P. Giri, M. Panda & U. C. Sahoo)*

- Simple evaluation of NOx degradation by nano-TiO2 coatings on road pavements under natural light

  *(M. Fang, Y. Cheng & L. Zhan)*

- Application of green calcium sulphoaluminate cement to prepare foamed concrete for road embankmen

  *(H. Yuan, Z. Ge, R. Sun, Y. Guan, Y. Huo & H. Zhang)*

- Properties and applicability of pervious concrete for paving flags

  *(I. N. Grubeša, I. Barišić, B. Bačun & S. Juradin)*

- Research on shrinkage control technology of lightweight ultra-high performance concrete

  *(J. Fu, Z. Wang, Y. Min & Q. Ding)*
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<th>Time</th>
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<td>09:25 - 11:45 (GMT)</td>
<td>Recycling technology – Part 1</td>
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**Moderator:** Mingliang Li  
Research Institute of Highway Ministry of Transport  
li@rioh.cn

- Effect of Portland Pozzolanic Cement filler on waste mixed plastic modified bituminous mix  
  *(S. Karmakar, T. K. Roy & U. Naveen)*
- Influence of reaction time on interaction mechanism of rejuvenator composed by crumb rubber and waste cooking oil  
  *(X. Yi, R. Dong, M. Zhao, C. Shi & J. Yang)*
- The use of gyratory compaction to assess the workability of asphalt mixtures evaluation  
  *(A. Margaritis, T. Tanghe, J. D. Visscher, S. Vansteenkiste & A. Vanelstraete)*
- The rheological properties of terminal blend hybrid asphalt before and after aging  
  *(S. Wang & W. Huang)*
- Vehicle load simulator induced cracking in semi-dense asphalt with RCA filler  
  *(P. Mikhailenko, M. Arraigada, Z. Piao & L.D. Poulikakos)*
- Method for reducing RAP agglomeration and variability, increasing RAP content: fine separation  
  *(H. Zhan, N. Li, W. Tang, Z. Wang, X. Yu & H. Ma)*
- Study on the influence of red mud on the durability of asphalt mixture and its modification  
  *(J. Zhang, C. Guo, J. Wang, K. Wang, C. Ma, M. Liang & Z. Yao)*
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<tr>
<td>09:25-11:45 (GMT)</td>
<td><strong>Functional pavement design- Part 1</strong></td>
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<td>Moderator: Zhen Leng  Hong Kong Polytechnic University <a href="mailto:zhen.leng@polyu.edu.hk">zhen.leng@polyu.edu.hk</a></td>
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<td>- Fatigue models for airfield concrete pavement: review and discussion (J. Yuan, W. Li, X. Jia, Z. Zhou &amp; L. Ma)</td>
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<td>- Exploration on overlay tester test analysis for anti-cracking ultra-thin layer mixes (J. Tian, Y. Dong, Y. Hou, X. Tong &amp; J. He)</td>
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<td>- Asphalt pavement unified mechanical potential damage model for top-down cracks and rutting distress (J. Song, J. Shi, H. Wang &amp; X. Li)</td>
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<td>- Research on freeze-thaw fatigue of asphalt mixture based on ADE theory (W. Zhan, S. Gao, Y. Yu, D. Xiao &amp; J. Wang)</td>
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<td>- Reliability analysis of asphalt mixture and pavement based on MC method (Y. Sun, Z. Zheng, L. Li &amp; J. Wang)</td>
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<td></td>
<td>- Case study: crack propagation in situ vs. service life prediction (A. Blasl, A. Zeißler &amp; F. Wellner)</td>
</tr>
<tr>
<td></td>
<td>- Study on the influence of coarse aggregate blends of different sizes and proportions on the homogeneity of asphalt mixtures (W. Yu, C. Xing, D. Wang &amp; G. Lu)</td>
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</tbody>
</table>
### MONDAY (JULY 12)_Day 1 Keynote Speech

**Keynote Speech: Prof. Hussain Bahia, University of Wisconsin-Madison**

**Keynote Speech: Prof. Lijun Sun, Tongji University**

Moderator: Prof. Sandra Erkens, Delft University of Technology

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### MONDAY (JULY 12)_Day 1

Session number: 4

**Green and sustainable pavement materials – Part 2**

Moderator: Feipeng Xiao  
Tongji University  
fpxiao@tongji.edu.cn

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentations</th>
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</table>
| 13:05-15:45   | • Asphalt modified by finely dispersed sidewall tire rubber with excellent low temperature performance  
(X. Yu, Y. Xie & S. Wang)  
• Wide spectral response titanium dioxide for degrading vehicle exhaust in asphalt pavement  
(Z. Hu, T. Xu, P. Liu & M. Oeser)  
• Effect of three-component polyurethane adhesive on the interlaminar bonding performance of poro-elastic road surface  
(J. Li, M. Li, J. Li, W. Ren & H. Wu)  
• Characterization of asphalt binder using tackiness properties  
(S. N. Suresha & V. H. Kumar)  
• Investigation on the temperature field distribution of porous asphalt mixture with steel slag aggregates heated by microwave  
(Y. Wang, X. Chen, Z. Liu & Q. Dong)  
• Rheological behavior of asphalt binder based on time-temperature superposition principle: a molecular dynamics simulation study  
• Effects of SARA fractions on low-temperature properties of crumb rubber modified binders  
(T. Wang & F. Xiao)  
• Microstructure and Modelling of Waterborne Epoxy Resin Modified Bitumen Emulsion  
(R. Li, Z. Leng*, H. Wang, G. Lu, H. Yu) |

*Corresponding author*
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<th>Time</th>
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<td>13:05-15:45</td>
<td>Recycling technology – Part 2</td>
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<td>GMT</td>
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<tr>
<td>Moderator</td>
<td>Gordon Airey</td>
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<tr>
<td>University</td>
<td>The University of Nottingham</td>
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<tr>
<td>Email</td>
<td><a href="mailto:gordon.airey@nottingham.ac.uk">gordon.airey@nottingham.ac.uk</a></td>
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<tr>
<td>Evaluation</td>
<td>Evaluation of low temperature performance of oil modified asphalt using</td>
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<td>the glass transition temperature</td>
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<td></td>
<td>(J. Xu, C. Xing, Z. Fan, B. Hong, D. Wang &amp; G. Lu)</td>
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<tr>
<td>Resource</td>
<td>Resource recycling of the industrial solid waste in induction asphalt</td>
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<tr>
<td>mixture</td>
<td>mixture</td>
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<td>(C. Fu, K. Liu, Q. Liu &amp; P. Liu)</td>
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<tr>
<td>Rheological</td>
<td>Rheological and chemical characterization on the polymer modified</td>
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<td>bitumen with different rejuvenators</td>
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<td>(P. Lin, X. Liu, S. Ren, S. Erkens &amp; S. Nahar)</td>
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<tr>
<td>Utilization</td>
<td>Utilization of RAP for the construction of CTB containing thin bituminous</td>
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<td>pavement layer and chemical stabilizer</td>
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<td>(R. S. Chhabra, G. D. Ransinchung R. N., S. Vallabhaneni, K. M. Remella</td>
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<td></td>
<td>&amp; A. Singh)</td>
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<tr>
<td>Equivalence</td>
<td>Equivalence testing of iCCL and BBR low-temperature continuous grade</td>
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<td>(H. Azari &amp; A. Mohseni)</td>
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<tr>
<td>Rheological</td>
<td>Rheological and chemical properties of bitumen during hot in-place</td>
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<td>properties</td>
<td>recycling</td>
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<td>(J. Wang, F. Xiao &amp; X. Qian)</td>
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<td>The influence</td>
<td>The influence of long-term aging on the chemical properties of bitumen</td>
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<td>(S. Ren, X. Liu, P. Lin &amp; S. Erkens)</td>
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<td>Application</td>
<td>Application of Machine Learning to Determine the Influence of Particle</td>
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<td>Size Distribution on Stability of Bituminous Mixes</td>
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<td>(H. Chakravarty, S. Sinha)</td>
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<td><strong>Functional pavement design – Part 2</strong></td>
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| Moderator: Miomir Miljković  
University of Niš  
miomir.miljkovic@outlook.com |
|-----------------|
| • Rutting depth prediction model of airfield composite pavement  
(L. Man, J. Ling, L. Ren, Z. Wang & J. Gao.)  |
| • The benefit of joint heaters for asphalt surface construction  
(G. White)  |
| • Study on the seasonal variation and deterioration behavior of the skid resistance performance of asphalt pavement  
(Y. He, D. Wang, C. Xing, C. Wang, Q. Tan & B. Hong)  |
| • Field evaluations of nuclear and non-nuclear gauges as alternates to destructive coring for airport asphalt density testing  
(G. White & F. Alrashidi)  |
| • Effect of climate region on field oxidative ageing of asphalt pavements using multiphysics modelling approaches  
(E. Omairey & Y. Zhang)  |
| • Passing rate difference analysis on dense and stone matrix gradations of asphalt mixtures  
(Z. Zhao, J. Li, X. Xiao, Z. Li & F. Xiao)  |
| • Pavement coding method providing high-precision positioning for vehicles  
(L. Zhao, H. Zhao, D. Gao & J. Cai)  |
| • Noise absorption and fatigue behavior of prefabricated pavement textures assisted with 3D printing technology.  
(S. Wei, Y. Wang & X. Chen)  |
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<tr>
<th>09:25-11:45 (GMT)</th>
<th>Warm &amp; cold mix asphalt materials – Part 1</th>
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<td>Moderator: Yuhong Wang</td>
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<td>Hong Kong Polytechnic University</td>
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<td><a href="mailto:yuhong.wang@polyu.edu.hk">yuhong.wang@polyu.edu.hk</a></td>
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<td></td>
<td>• Two comprehensive cracking resistance indexes of asphalt mixtures using non-notched semi-circular bending tests (D. Xu, F. Ni, Z. Zhao &amp; D. Zheng)</td>
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<td>• Investigation on influencing factors of moisture susceptibility of warm mix asphalt based on surface free energy (L. Liu, L. Liu, Y. Yu &amp; L. Sun)</td>
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<td>• Viscoelastic finite element modeling of flexible pavement patching (Y. Lu &amp; R. M. Hajj)</td>
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<td>• Computer molecular dynamics simulation study on the asphalt molecular model construction based on time-of-flight mass spectrometry (K. Hu, C. Yu, D. Wang, Y. Chen &amp; S. Han)</td>
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<td>• Study on blending degree of virgin and aged asphalt in hot recycled mixture based on aggregates surface properties (S. Chen, X. Cai, L. Chen, K. Wu, J. Xie, H. Xiao &amp; H. M. Z. Hassan)</td>
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<td>• Laboratory performance assessment of low temperature asphalt mixtures with high recycled materials contents (P. Georgiou &amp; A. Loizos)</td>
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<td>• Calculation derivation and test verification of indirect tensile strength of asphalt pavement interlayers at low temperatures (Q. Zhang, Z. Fang, Y. Xu &amp; Z. Ma)</td>
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<td>09:25-11:45 (GMT)</td>
<td>Pavement preservation, maintenance and rehabilitation – Part 1</td>
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<td>Moderator: Dawei Wang</td>
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<td>Harbin Institute of Technology <a href="mailto:dawei.wang@hit.edu.cn">dawei.wang@hit.edu.cn</a></td>
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<td>• Verification of the rigid layer depth setting model based on the consistency of backcalculated subgrade modulus (Y. Hu, L. Sun &amp; G. Zang)</td>
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<td>• Study on nonlinear behavior of soil-cement based on CTS model (W. Zhan, X. Yan, Z. Hu, Y. Yu &amp; J. Wang)</td>
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<td>• A method for prediction and maintenance planning of multi-lane pavement (X. Tong, Y. Hou, Y. Dong, Y. Zhang &amp; J. Tian)</td>
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<td>• Study on decay behavior of asphalt pavement slip resistance performance (X. Lin)</td>
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<td>• Pavement roughness level classification based on logistic and decision tree machine learnings (H. Han, T. Zhang, Q. Dong, X. Chen &amp; Y. Wang)</td>
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<td>• Towards more realistic accelerated laboratory aging of asphalt samples (G. White &amp; A. Abouelsaad)</td>
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<td>• Effects of curing time on performances of high-viscosity modified asphalt (M. Li, H. Lu, J. Xu, J. Li &amp; H. Wu)</td>
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### Smart pavement materials and structures – Part 1

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<tr>
<th>Time</th>
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<tr>
<td></td>
<td>Experimental analysis of piezoelectric transducers applications for energy harvesting pavement (H. Zhao, C. Li &amp; L. Ma)</td>
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<td>Investigation on bulk material compaction and mixing via real-time sensing technology (C. Wang, P. Liu, C. Schulze, M. Oeser &amp; J. Friederichs)</td>
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<td>Application of one-third scale accelerated pavement testing (APT) to study the high temperature performance of China Qingchuan rock asphalt modified asphalt (Y. Ye, C. Zhuang &amp; Y. Wang)</td>
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<td>Research on ice interfacial and mechanical behavior of ski jumping inruns (Y. Sun, C. Wu &amp; C. Sun)</td>
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<td></td>
<td>Implementation of engineering procurement construction contracting in civil aviation infrastructure pilot projects practice in China (C. Zhou)</td>
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Moderator: Xue Luo  
Zhejiang University  
xueluo@zju.edu.cn
### TUESDAY (JULY 13)_Day 2

**Keynote Speech:** Prof. Baoshan Huang, University of Tennessee  
**Keynote Speech:** Prof. Louay Mohammad, Louisiana State University  
Moderator: Prof. Tom Scarpas, Khalifa University

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Topic</th>
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</table>
| 11:50-13:00 (GMT) | Keynote | Keynote Speeches: Prof. Huang (University of Tennessee), Prof. Mohammad (Louisiana State University)  
Moderator: Prof. Tom Scarpas (Khalifa University) |
| 13:05-15:45 (GMT) | **Warm & cold mix asphalt materials – Part 2** |  
Moderator: Evangelos Manthos  
Aristotle University of Thessaloniki  
emanthos@civil.auth.gr  
- Use of recycled concrete aggregate in cold bituminous emulsion mix  
  (*S. Jain & B. Singh*)  
- Low-temperature performance test method and improvement measures of emulsified asphalt cold recycling mixture  
  (*Z. Han, Y. Meng, T. Jin, L. Liu & L. Sun*)  
- Moisture susceptibility evaluation of RAP based foamed bituminous mix  
  (*L. Gupta, R. Kumar, A. Kumar*)  
- Effect of foaming water on the rheological properties of foamed asphalt binder and compactability of stabilized RAP in cold recycling  
  (*W. Ma, D. Wang & R. West*)  
- Micro recovery, aging, and performance grading of emulsified asphalt using UPTiM  
  (*A. Mohseni & H. Azari*)  
- Research on diffusion process of new and old asphalt based on SEM  
  (*X. Tian, X. Lu, H. Hu, C. Guo & G. Li*)  
- Low-temperature fracture behaviour of synthetic polymer-fibre reinforced warm mix asphalt  
  (*C. G. Daniel, X. Liu, P. Apostolidis, S.M.J.G. Erkens & A. Scarpas*)  
- Preparation and performance of hydrophobic coating for tunnel with photocatalytic NO-degrading function  
  (*G. Liu, H. Xia, Y. Niu, W. Zhang, L. Lang, H. Geng, L. Song*) |
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<tr>
<th>Time</th>
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<tr>
<td>13:05-15:45</td>
<td>Field assessment of rigid pavement stabilization using cementitious grout: case study (H. Zhao, C. Li, L. Ma &amp; Z. Tao)</td>
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<td>Predicting the pavement performance: a comparison on traditional and multivariate time series model (W. Jiang &amp; Q. Dong)</td>
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<td>Research on information management of Airport pavement quality based on BIM and GIS integration (Z. Liu, X. Gua &amp; L. Wang)</td>
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<td>Study on comprehensive evaluation of pavement condition based on comprehensive integration weighting method and cloud model (M. Xiao &amp; L. Fan)</td>
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<td>Study on the instantaneous healing characteristic of asphalt under cyclic loading (L. Zhou, W. Huang, Q. Lv &amp; L. Sun)</td>
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<td>Preliminary field and laboratory investigation on the use of non-contact digital ski sensor as pavement-smoothing technology in the South Korea expressway network (A. C. Falchetto &amp; K. H. Moon)</td>
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<td>Use of Non-Potable Water in Pavement Construction: A Laboratory Study using Seawater (A. Rampersad, G. Mvelase)</td>
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<tr>
<td>13:05-15:45 (GMT)</td>
<td>Smart pavement materials and structures – Part 2</td>
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| **Moderator:** Yuqing Zhang  
Aston University  
y.zhang10@aston.ac.uk |
| **A surface induced, Internet of Things (IoTS) powered porous pavement system**  
(Y. Wang) |
| **Utilization of PEG/SiO2 phase change composite to regulate open-graded friction course temperature**  
(J. Chen & X. Shi) |
| **Lightweight design for smart precast concrete pavement based on topology optimization method**  
(H. Chen, H. Zhao & X. Fu) |
| **Characterization of aggregate packing using digital image analysis**  
(V.T. Thushara, U. Chakkoth & J. M. Krishnan) |
| **Strain sensing behavior of epoxy composites with nano/micro hybrid CNT/GNP and CNT/CB for asphalt road in situ strain monitoring**  
(M. Liang, Z. Qiu, L. Su & Y. Rong) |
| **Recycling of waste glass fiber reinforced polymer (GFRP) power as alternative filler for asphalt mastics**  
(J. Lin, B. Hong, T. Li, D. Wang, Z. Fan & S. Leischner) |
| **Estimate of VOCs release amount from asphalt pavement within its full life cycle**  
(X. Chang & Y. Xiao) |
| **Quantifying the accuracy of roller segmented compactor in simulating field compaction**  
(P. D. Cheyyar Nageswaran, S. R. Miller, F. Bijleveld & N. Poeran) |
### Eco-efficiency pavement materials – Part 1

**Moderator:** Tao Ma  
Southeast University  
[mailto:matao@seu.edu.cn](mailto:matao@seu.edu.cn)

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<tr>
<th>Time</th>
<th>Presentation</th>
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| 09:25-11:45 (GMT) | • Study on performance of reclaimed rubber modified asphalt by lubricant by-products  
  *(P. Kong, G. Xu, J. Yang & X. Chen)*  
• An overview of the heat exchanging asphalt layer prototype: a case study  
  *(T. Ghalandari, L. Verheyden, N. Hasheminejad, R. Baetens, W. Van den bergh & C. Vuye)*  
• Experimental study on basic properties of basalt fiber reinforced concrete  
  *(L. Yu, X. Li & L. Bao)*  
• Research on strength and microstructure of fibre foamed concrete  
  *(T. Qiu, C. Xing, Y. Tan, J. Xu, X. Liu, L. Wang, Y. Wang, C. Chen & L. Zhao)*  
• Influence of red mud filler on the fatigue behaviour of bituminous mastic  
  *(M. Chaudhary, N. Saboo, A. Gupta & M. Miljković)*  
• Effect of carbon nanofibers on mechanical and microstructural properties of geopolymer based on lunar regolith simulant  
  *(R. Zhang, S. Zhou, Z. Yang & F. Li)*  
• A temperature-independent methodology for bitumen modification evaluation based on DSR measurement  
  *(Q. Liu, H. Wang, J. Wu, M. Oeser)* |
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<tr>
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<th>Moderator</th>
<th>Title</th>
<th>Authors</th>
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<tr>
<td>09:25-11:45</td>
<td>14</td>
<td>Yue Xiao</td>
<td>Mechanical characterization</td>
<td>Wuhan University of Technology <a href="mailto:xiaoy@whut.edu.cn">xiaoy@whut.edu.cn</a></td>
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<td>• Damage mechanism in asphalt binder time sweep test from the perspective of failure appearance</td>
<td>(Z. Zhang, Q. Liu, P. Liu &amp; M. Oeser)</td>
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<td>• Wetting deformation characteristics of granite residual soils and the micro-mechanism</td>
<td>(Z. Wang, J. Ling, Z. Bian &amp; L. Man)</td>
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<td>• Evaluation of rutting performance of high modulus asphalt mixture based on the modulus index</td>
<td>(H. Zhang, M. Zhang, Y. Guan, G. Huang, Y. He, J. Zhang)</td>
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<td>• Modeling and characterizing the mesomechanical behavior of asphalt mixture with random aggregate distribution: a coupled topological-numerical method</td>
<td>(C. Du, P. Liu &amp; M. Oeser)</td>
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<td>• Research on morphological characteristics of coarse aggregates based on image processing</td>
<td>(R. Jiang, X. Zhou, M. Ran, Z. Zhao, Y. Yan &amp; J. Guan)</td>
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<td>• Non-linear modeling of the influence of rest period on healing behavior of asphalt concrete mixtures</td>
<td>(N. Roy, V. Chowdary, U. Saravanan &amp; J. M. Krishnan)</td>
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### Pavement monitoring and big data analysis – Part 1

**Moderator:** Xingyi Zhu  
*Tongji University zhuxingyi66@tongji.edu.cn*

- A thermal digital twin for condition monitoring of asphalt roads  
  *(L. Barisic, E. Levenberg, A. Skar, A. Boyd & P. Zoulis)*
- Big data in roads and pavements: insights from a bibliometric study and a critical review of recent publications  
  *(S. Bhat & S. N. Suresha)*
- 3D texture reconstruction of asphalt pavement based on MATLAB  
  *(Q. Chen, F. Peng & M. Zhang)*
- 3D textural fractal characterization and its correlation with the skid resistance of asphalt pavement  
  *(W. Xiong, A. Liu & M. Zhang)*
- Damage fracture characterization of asphalt mixtures under freeze-thaw cycles based on acoustic emission monitoring  
  *(L. Fu, W. An & X. Chen)*
  *(J. Blom & H. Soenen)*
- Research on prediction model of asphalt pavement subsidence development based on Back Propagation Neural Network  
  *(M. Xiao & S. Qian)*
**WEDNESDAY (JULY 14)_Day 3**

**Keynote Speech:** Dr. Lily Poulikakos, Empa  
**Keynote Speech:** Prof. Hongduo Zhao, Tongji University  
Moderator: Dr. Xueyan Liu, Delft University of Technology

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**WEDNESDAY (JULY 14)_Day 3**  
**Session number:** 16

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**Eco-efficiency pavement materials – Part 2**

Moderator: Pengfei Liu  
RWTH Aachen University  
liu@isac.rwth-aachen.de

- A preliminary approach for comparative life cycle assessment of flexible and rigid pavements - a case study  
  *(B. S. S. Varun, J. Choudhary & A. Gupta)*
- Reduction of accumulated plastic deformations in bases courses  
  *(L. Vollmert)*
- The fatigue life extension prospect of calcium alginate capsules in porous asphalt  
  *(S. Xu, X. Liu, A. Tabaković & E. Schlangen)*
- Investigation of fog seal with waterborne thermosetting materials in airport pavement  
  *(L. Xu & F. Xiao)*
- Microstructural and rheological analysis of crumb rubber modified bitumen  
  *(J. B. Borinelli, J. Blom, G. Jacobs, D. Hernando, W. van den bergh & C. Vuye)*
- Towards lower enviromental-impact of asphalt materials with lower VOCs release  
  *(Y. Xiao)*
- Effect of Chemical Stabilization of Silty Soil on Strength and Durability Characteristics for Construction of Low Volume Roads in India  
  *(S. Kumar Mahto, S. Sinha, S. Saurav, H. Chakravarty)*
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<tbody>
<tr>
<td>13:05-15:25</td>
<td>Safety technology for smart roads</td>
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</table>

Moderator: Katerina Varveri  
Technical University of Delft  
a.varveri@tudelft.nl

- Monitoring-based maintenance decision-making models for subgrade settlement  
  *(Z. Duan, C. Gui & Y. Hou)*
- Analysis of compensatory driving behavior under fog weather conditions  
  *(Y. Zhang, Z. Guo, B. Zhu, Z. Fan & H. Zhang)*
- Three-dimensional flow simulation of Open Graded Friction Course’s permeability  
  *(S. Zhang, O. Elkhateeb & H. Feng)*
- Development of a tire-pavement friction model incorporating the water effect  
  *(J. Cai, H. Zhao, X. Qian, Z. Du & L. Zhao)*
- Research on load effect based on bridge pavement repairing of the old bridge  
  *(M. Xiao, S. Qian & C. Wang)*
- Evaluating the driving safety of highway based on the differential water film analysis  
  *(X. Gong, Y. Geng, Y. Ma & X. Chen)*
- Measurement, modeling and validation of skid resistance of asphalt concrete pavement: Laboratory to field literature review  
  *(A. Kumar, A. Gupta & K. Anupam)*
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<td>13:05-15:25</td>
<td><strong>Pavement monitoring and big data analysis – Part 2</strong></td>
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<td>Moderator: Eyal Levenberg</td>
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<td>Technical University of Denmark</td>
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<td><a href="mailto:eylev@byg.dtu.dk">eylev@byg.dtu.dk</a></td>
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<tr>
<td></td>
<td>• A multi-objective optimization model on taxiing mode selection and</td>
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<td>aircraft stands allocation for closely spaced parallel runway</td>
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<td>(J. Ling, Y. Fang, X. Li &amp; G. Wang)</td>
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<td>• Taxiing aircraft monitoring through pavement vibration sensing</td>
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<td></td>
<td>(Z. Bian, K. Peng, H. Zhao &amp; M. Zeng)</td>
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<td></td>
<td>• Effectiveness rejuvenation in Porous asphalt</td>
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<td></td>
<td>(M. Moenielal, D. van Vliet, W.L.C. van Aalst, J.W.F. van der Kemp, P.</td>
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<td>The &amp; A. Varveri)</td>
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<td></td>
<td>• Classification of roughness for asphalt pavement resurfacing treatments</td>
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<td></td>
<td>based on SVM-KNN machine learning algorithm using LTPP data</td>
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<td></td>
<td>(L. Wang, T. Zhang, Q. Dong &amp; W. Jiang)</td>
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<td></td>
<td>• Morphology characterization of aggregate with 3D curvature analysis</td>
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<td>(F. Wang &amp; Y. Xiao)</td>
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<td></td>
<td>• Evolution rule of dynamic response of asphalt pavement under lateral</td>
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<td>movement test by MLS66</td>
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<td>(C. Wu, Y. Huang, B. Zheng, R. Cao, X. Gu &amp; H. Ren)</td>
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<td>• Investigating vibration characteristics at concrete pavement joints</td>
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<td>using distributed optical fiber sensors</td>
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<td>(Z. Bian, M. Zeng, H. Zhao, H. Chen &amp; K. Cheng)</td>
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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>15:30-15:50</td>
<td><strong>WEDNESDAY (JULY 14) Day 3 Closing session</strong></td>
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<tr>
<td></td>
<td>Moderator: Dr. Xueyan Liu, Delft University of Technology; Feipeng Xiao,</td>
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<td>Tongji University</td>
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### IFRAE 2021 - Workshops

**THURSDAY (JULY 15)_Day 4**  
**Workshop number: 1**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Organizer</th>
<th>Affiliation</th>
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</thead>
<tbody>
<tr>
<td>09:25-12:25 (GMT)</td>
<td>Vehicle-road interaction and driving safety: towards a Connected, Coordinated and Automated Road Transport</td>
<td>Prof. X. Zhu and Prof. Denis Jelagin</td>
<td>Tongji University, China and KTH Royal Institute of Technology, Sweden</td>
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**THURSDAY (JULY 15)_Day 4**  
**Workshop number: 2**

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<th>Time</th>
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<th>Organizer</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>09:25-12:25 (GMT)</td>
<td>Shaping a sustainable future for asphalt pavements</td>
<td>Prof. A. Cannone Falchetto &amp; Dr. D. Wang</td>
<td>Aalto University, Finland &amp; Technical University of Braunschweig, Germany</td>
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**THURSDAY (JULY 15)_Day 4**  
**Workshop number: 3**

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<tbody>
<tr>
<td>09:25-12:25 (GMT)</td>
<td>Fast Moving Loading Big Data and Standards of Mobile Load Simulator(MLS)</td>
<td>Yuchen Wang</td>
<td>International Society of Mobile Load Simulator(ISMLS)</td>
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**THURSDAY (JULY 15)_Day 4**  
**Workshop number: 4**

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<tbody>
<tr>
<td>12:30-15:30 (GMT)</td>
<td>Changes in binder properties and the role of additives</td>
<td>Dr. S.N. Nahar &amp; Dr. X.Liu</td>
<td>TNO &amp; Delft University of Technology, the Netherlands</td>
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**SUNDAY (JULY 11)_Day 0**  
**Workshop number: 5**

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<th>Affiliation</th>
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<tbody>
<tr>
<td>12:30-15:30 (GMT)</td>
<td>Smart pavement – vehicle monitoring, tools and technics for functional pavement</td>
<td>Dr. A. Kumar &amp; Dr. H. Wang</td>
<td>Delft University of Technology, the Netherlands &amp; Rutgers University, the US</td>
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Programme

5th International Symposium on Frontiers of Road and Airport Engineering

July 12-14, 2021

Delft University of Technology