

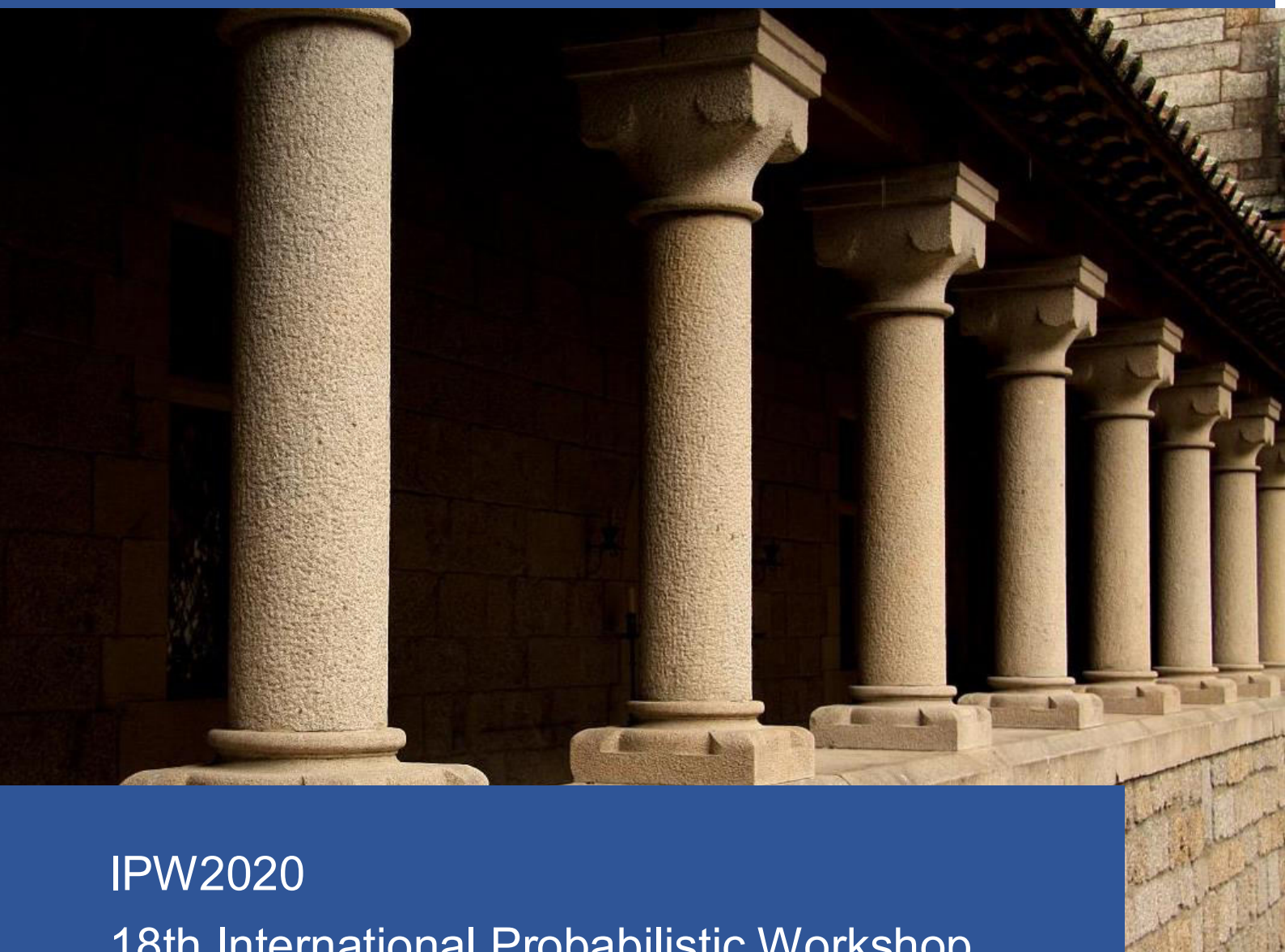
# IPW 2020

18<sup>th</sup> International Probabilistic Workshop

May 12-14, 2021

Streamed from Guimarães

Portugal



IPW2020

18th International Probabilistic Workshop

## FINAL PROGRAMME

Organised by:



University of Minho  
School of Engineering



isise Institute for Sustainability and  
Innovation in Structural Engineering

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# WELCOME MESSAGE

Dear Colleagues and Friends,

Welcome to the 18th International Probabilistic Workshop (IPW2020), organised by the Institute for Sustainability and Innovation in Structural Engineering (ISISE), School of Engineering, University of Minho.

The need to handle uncertainty and to make informed decisions renders evident the importance of the probabilistic and reliability topics. This can be seen in the most recent advances on the topic of existing infrastructure maintenance and management, especially those related to safety and security under extreme events. Additionally, it is well-known that climate change issues are becoming even more relevant, with an impact on society, mostly affecting the likelihood and consequences of some natural hazards. Indeed, there is a need to develop deeper studies on data science, as well as on its application to system analysis, combining probabilistic and reliability tools to face the huge uncertainty.

The International Probabilistic Workshop (IPW) series started in 2003 as the Dresden Probabilistic Symposium at the Technical University of Dresden, repeated in 2004. In 2005, the 3rd edition held in Vienna was renamed as International Probabilistic Workshop. Previous IPWs took place in Berlin (2006), Ghent (2007), Darmstadt (2008), Delft (2009), Szczecin (2010), Braunschweig (2011), Stuttgart (2012), Brno (2013), Weimar (2014), Liverpool (2015), Ghent (2016), Dresden (2017), Vienna (2018) and Edinburgh (2019).

The IPW2020 was planned to take place in September 2020 at the University of Minho, Guimarães, Portugal. Unfortunately, the worldwide COVID-19 pandemic forced the postponement of the event to May 2021 and the adoption of a full online format. Nevertheless, the scientific value of the contributions ensures the high quality of this Workshop, keeping the same scientific level as the previous ones. During the three-day virtual event, more than 60 presentations will be streamed worldwide using a streaming platform specifically developed for this event. Furthermore, five keynote lectures will be delivered by distinguished researchers on the topics of IPW2020. Finally, the Young Presenter Award was constituted as a prize of excellence, which hopefully will continue in the subsequent Workshops and attract talented young researchers to the field.

Last but not least, we would like to express our gratitude to all authors, keynote speakers, organizers of special sessions and participants for their valuable contributions, members of the Scientific Committee for their meticulous work, and the Workshop Secretariat for the dedicated teamwork, particularly during this exceptional pandemic period.

We invite you to explore all available resources and tools offered by this online event, for advancing your research and for enriching your cooperation with colleagues with mutual interests. During May 12-14, we urge you to stay tuned, be active and enjoy the IPW2020.

José C. Matos  
Paulo B. Lourenço  
Daniel V. Oliveira  
Dirk Proske  
Jorge Branco  
Rui A. Silva  
Hélder S. Sousa

# COMMITTEES

## Organizing Committee

José C. Matos, University of Minho, Portugal, Chair  
Paulo B. Lourenço, University of Minho, Portugal, Chair  
Dirk Proske, Axpo Power AG, Switzerland  
Jorge M. Branco, University of Minho, Portugal  
Hélder S. Sousa, University of Minho, Portugal

## Scientific Committee

Daniel V. Oliveira, University of Minho, Portugal, Chair  
Angelo Palos Teixeira, University of Lisbon, Portugal, Vice-Chair  
Laura Caldeira, National Laboratory for Civil Engineering, Portugal, Vice-Chair  
Luís Andrade Ferreira, University of Porto, Portugal, Vice-Chair  
Rui A. Silva, University of Minho, Portugal, Secretary

## Members

Abel Henriques, Portugal	Alfred Strauss, Austria	André Orcesi, France
Andre T. Beck, Brazil	António Cândido, Portugal	Bernt J. Leira, Norway
Bram van den Eijnden, The Netherlands	Bruno Sudret, Switzerland	Carmen Andrade, Spain
Dan M. Frangopol, USA	Daniel Straub, Germany	Daniil Yurchenko, UK
Dimitri Val, UK	Dirk Proske, Switzerland	Edoardo Patelli, UK
Eduardo Cavaco, Portugal	Emilio Bastidas-Arteaga, France	Frank Coolen, UK
Hélder S. Sousa, Portugal	Ioannis Kougoumtzoglou, USA	Javier Ortega, Portugal
Jianye Ching, Taiwan	Joan R. Casas, Spain	Joaquim Tinoco, Portugal
Jochen Kohler, Norway	Jorge M. Branco, Portugal	Jose C. Matos, Portugal
Junho Song, South Korea	Konrad Bergmeister, Austria	Leonardo Rodrigues, Portugal
Luís C. Neves, UK	Luís C. Silva, Portugal	Mário Coelho, Portugal
Mark Stewart, Australia	Matthias Voigt, Germany	Mauricio Sánchez-Silva, Colombia
Maximilian Huber, Austria	Micaela Demichela, Italy	Michael Beer, Germany
Michael H. Faber, Denmark	Michel Ghosn, USA	Miroslav Sýkora, Czech Republic
Mitsuyoshi Akiyama, Japan	Mohamed Eid, France	Panagiotis Spyridis, Germany
Paula V. Ferreira, Portugal	Paulo B. Lourenço, Portugal	Peter Mark, Germany
Pieter van Gelder, The Netherlands	Radomir Pukl, Czech Republic	Raphael Steenbergen, The Netherlands
Raquel Menezes, Portugal	Rita Bento, Portugal	Robby Caspeepe, Belgium
Roman Wan-Wendner, Belgium	Tiago M. Ferreira, Portugal	Timo Schweckendiek, Netherlands
Tom Lahmer, Germany	Vasily Demyanov, UK	Vikram Pakrashi, Ireland
Xin Ruan, China		

# WORKSHOP FORMAT

The IPW2020 aims at providing an international forum for the debate on topics such as the resilience, robustness and redundancy of infrastructure systems, risk assessment and management, climate change and loading uncertainties, novel decision-making frameworks, and many other topics related to the fundamentals and application of probabilities.

## Keynote Lectures

Five keynote lectures will be live-streamed and will be given by internationally renowned researchers on the topics of the Workshop, addressing the most innovative findings of their ongoing work. The participants will be able to make their questions during each lecture, which will be answered after each presentation.

## Sessions

Sessions will consist of pre-recorded presentations on the topics of the workshop and will deal with cutting-edge research results, technical developments on innovative and traditional methods, project and case studies presentations, as well as lessons learned and prospects. Each contribution to these sessions consists of a paper of six to ten pages and a presentation. Four special sessions on topics proposed specifically by highly respected researchers will also be streamed. Finally, the participants will have the opportunity to ask questions to the presenting authors, which will be answered at the end of each session.

## Guidelines for presenting authors

### *Pre-recorded presentation*

All presenting authors should prepare and send a pre-recorded video of their oral presentation until May 1. The video file of the presentation must be in MP4 format, with a duration ranging between 10 and 12 minutes. These are prerequisites for the communication to be included in the final programme of IPW2020. The pre-recorded videos will become available to the participants during the workshop after their presentation and will be accessible for a subsequent period of 30 days.

There are several applications available to easily record presentations (PowerPoint, Loom, Bluejeans, etc.), though using Zoom is recommended (see instructions below). The pre-recorded presentation should include a window box with the speaker via webcam, instead of a voice-over presentation only. A PowerPoint template and a webcam background image are available at the [IPW2020 website](#), and their use is recommended.

To assure a good quality of the sound and image of the pre-recorded presentation, please consider the following recommendations:

- Use a place for recording as quiet as possible;
- Avoid areas that have echo or bad acoustics;
- If possible, use a good microphone close to the mouth;
- Speak slowly and enunciate clearly, without pausing;
- Make sure you have an adequate front light, which should shine brightly on your face. If your back is to a window, close the shades;
- Put the camera at eye level;
- Do a test recording of a couple of minutes and review the sound and picture quality before recording the entire presentation. Make adjustments if needed;
- Record the video with HD resolution (720p) or higher.

After recording, rename the MP4 file with your paper ID (e.g. Paper08.mp4) and upload it online using a cloud storage service (e.g. Wetransfer, Dropbox, Onedrive, Mega, etc.). Then, send the download link to the IPW2020 Secretariat by email ([secretariat@ipw2020.com](mailto:secretariat@ipw2020.com)), providing the paper ID in the subject. Please check our tutorial presentation video [here](#).

### *Recording with Zoom*

- Install Zoom and create an account (if you did not do it yet);
- Define the provided IPW2020 background image (click [here](#)) as the virtual background of Zoom (this step is optional). Go to settings > Background & Filters and press the + button to add the image;
- Schedule a meeting to start immediately;
- Join the meeting;
- Make sure your camera and microphone are on;
- Press “share Screen” and select screen;
- Open your presentation and start the slideshow;
- Adjust the webcam window to an adequate position and size;
- Move the cursor up to display Zoom options, select more and then record. In alternative press ALT+R;
- Start your presentation and press stop recording when you finish. In alternative press ALT+R;
- End the meeting and Zoom will start converting your video file;
- After conversion, a window of the folder containing the file is open. By default, the videos are stored in the Zoom folder in Documents.

For further information please click [here](#).

### *During your session*

Please enter in the speakers’ room (StreamYard; access instructions will follow by email) at least 45 min before the end of the session, in order to test if everything is set properly before you go live for the Q&A and discussion period at the end of the presentations; use the link provided by the IPW2020 Secretariat. During this period, the Session Chairs will ask the questions collected from the participants during the streaming of the presentations and promote discussion among the participants.

### **Accessing the IPW2020 streaming platform**

Please access the IPW2020 streaming platform at <https://ipw2020.eventovirtual.pt/>, using the login credentials provided by the IPW2020 Secretariat. Note that the login credentials are individual and should not be transmitted. The platform is developed and optimized for the latest versions of Edge, Chrome, Firefox and Safari (Internet Explorer might not be compatible). In the first login, you will be asked to complete the information in your profile, which can be later edited in your Personal Area.


### **Attending the event**

Once you log in to the IPW2020 streaming platform, the live streaming of the event starts automatically. In the case of parallel Sessions, you have to select the room where the Session you want to attend is being transmitted. You can interact with the available menus without stopping the streaming. We encourage you to check the Program Schedule and select your favourite Sessions, so you do not miss them. You can also check the info provided by the presenting authors.

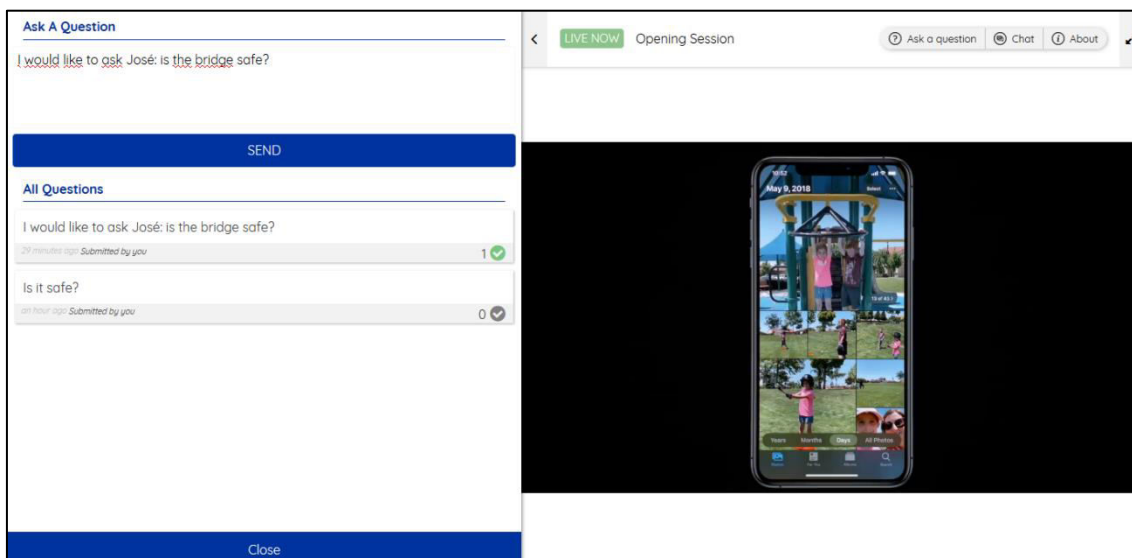
### **Networking in the IPW2020 streaming platform**

During the streaming of the IPW2020 event, you can use the platform to networking with other participants. You will have access to the list of participants and you will be able to send/receive messages and schedule private meetings. The platform also has a Live Chat and a Photo Feed, where you can leave your messages or post your photos for everyone.

### **Asking a question to the presenting authors**

During the streaming of Keynote Lectures and Sessions, the participants will be able to ask questions to the presenting authors by clicking “Ask a question” at the top right corner (see image below). Then, type the question and click “Send”. If you find that another participant already asked your question, you can put it in evidence by clicking , instead of adding a new question to the list. Please refer to the name of the presenting author in case you want him to address specifically your question. The questions will be collected by the Chairs, who will ask

them directly to the presenting authors at the end of all presentations in the session (period for Q&A discussion).



## REGISTRATION

Participants can register through the [IPW2020 website](#) by choosing one of the following categories. Payment confirmation notification is sent once it is processed successfully.

Registration Category	Early Bird Fee	Standard Fee
	(Until January 31, 2021)	(After January 31, 2021)
Regular	300 €	400 €
Student <sup>1</sup>	200 €	300 €
Keynote Lectures	-	50 €

<sup>1</sup> Student registration fee: full time students only. Student attendees must send an e-mail to the conference secretariat with a letter from their Department Head/Chair that states that the attendee is a full-time student, with full contact details.

Registration fees are VAT free, according to Portuguese regulations.

Regular and Student registration includes full access to the IPW2020 Workshop platform and a digital copy of the proceedings published by Springer.

Keynote Sessions registration includes only access to the five keynote lectures.

### Information for authors

The final acceptance of the submitted papers requires payment of the registration fee by the presenting author. Regular and Student registration allow the inclusion of up to two papers in the workshop proceedings and their oral presentation.

### Refund policy

Participants (non-authors) who cannot attend, and do not nominate a substitute, will receive a refund on their registration fee with a cancellation fee of 100 € if the refund request is sent by email until March 19, 2021. Participants are liable for their full fees after that date (i.e., no refund will be made). There will be no refund to participating authors. In this case, the paid fees can be transferred to a substitute presenting author.

# PROGRAMME OVERVIEW

Local time	CEST time	May 12 (Wednesday)		Local time	CEST time	May 13 (Thursday)		Local time	CEST time	May 14 (Friday)
08:30 09:15	09:30 10:15	Opening session		08:30 09:15	09:30 10:15	KL3 Bruno Sudret (ETH Zurich)		08:30 10:00	09:30- 11:00	Session 8
09:15 10:00	10:15 11:00	KL1 Ricardo Monteiro (IUSS Pavia)		09:15 10:00	10:15 11:00	Session 4		10:00 10:20	11:00 11:20	Coffee-break
10:00 10:20	11:00 11:20	Coffee-break		10:00 10:20	11:00 11:20	Coffee-break		10:20 11:05	11:20 12:05	KL5 Herbert Einstein (MIT)
10:20 11:45	11:20 12:45	Session 1		10:20 11:45	11:20 12:45	Session 5A	Session 5B	11:05 11:25	12:05 12:25	Closing session
11:45 12:00	12:45 13:00	Social activity		11:45 12:00	12:45 13:00	Social activity				
12:00 13:30	13:00 14:30	Lunch break		12:00 13:30	13:00 14:30	Lunch break				
13:30 14:15	14:30 15:15	KL2 Emilio Bastidas-Arteaga (La Rochelle University)		13:30 14:15	14:30 15:15	KL4 John D. Sørensen (Aalborg University)				
14:15 15:15	15:15 16:15	Session 2A	Session 2B	14:15 15:15	15:15 16:15	Session 6A	Session 6B			
15:15 15:35	16:15 16:35	Coffee-Break		15:15 15:35	16:15 16:35	Coffee-Break				
15:35 17:00	16:35 18:00	Session 3A	Session 3B	15:35 17:00	16:35 18:00	Session 7A	Session 7B			

Please, consider your time zone while scheduling your participation in IPW2020. See the table below.

City	Time
Guimarães (local time reference)	08:30
Paris	09:30
Pretoria	09:30
Helsinki	10:30
Beijing	15:30
Tokyo	16:30
Washington, D.C	03:30
Bogota	02:30



# TOPICS & SPECIAL SESSIONS

The IPW 2020 aims at bringing together experts on different engineering and science fields, and doctoral students looking for broad knowledge on the following main topics:

- Resilience, robustness and redundancy of infrastructure systems;
- Risk assessment and management;
- Climate change and loading uncertainties;
- Novel decision-making frameworks;
- Fundamentals and application of probability theories.

In addition to the above topics, four special sessions on specific topics were organised by highly respected international researchers, as follows:

## Special Session 1: May 12 (14:15-15:15 local time)

### Probabilistic tools for probabilistic vulnerability and lifetime assessment of infrastructure in the context of climate change & natural hazards in Atlantic area

**Organisers:** Mário Coelho (University of Minho), Vikram Pakrashi (University College Dublin), Emilio Bastidas-Arteaga (La Rochelle University)

In the present special session, the probabilistic vulnerability and lifetime assessment of transportation infrastructure to interceptable and non interceptable events under various climate change and variability scenarios is addressed. Considering the uncertainty associated with the occurrence of the natural hazards, the vulnerability of the infrastructures, as well as the ongoing climate change, variability and its effect on both hazard and vulnerability, the use of probabilistic tools is of relevance. The present session aims at gathering contributions from the research community developing and applying probabilistic tools in the context referred to before. The topics include, but are not limited to:

- Approaches for uncertainty and spatial variability quantification of the structural condition and deterioration processes.
- Probabilistic service life prediction (e.g., physical or surrogate models), impact quantification and digital twinning considering climate change and variability effects.
- Decision making and mitigation strategies of infrastructure systems related to climate hazards.

## Special Session 2: May 13 (10:20-11:45 local time)

### Reliability in geotechnical engineering

**Organisers:** Timo Schweckendiek (Deltares & Delft University of Technology), Bram van den Eijnden (Delft University of Technology)

Geotechnical engineering is subject to large uncertainties, not only due to spatially variable and uncertain ground conditions, but also due to significant model uncertainties involved in the design and assessment of geotechnical structures. There is increasing awareness that explicit treatment of uncertainties through uncertainty quantification and reliability analysis can be of great benefit to geotechnical engineering practice. Furthermore, the Eurocodes are reliability-based and facilitate reliability verification through probabilistic methods explicitly. This special session strives to highlight recent advances in geotechnical reliability and thereby to further advance the uptake of reliability methods in practical applications.

**Special Session 3: May 13 (14:15-15:15 | 15:35-17:00 local time)**

**Risk assessment and performance evaluation of critical infrastructures**

**Organisers:** Hélder S. Sousa (University of Minho), José C. Matos (University of Minho)

A critical infrastructure is an asset or system which is crucial for the maintenance of a society vital functions. Therefore, the socio-economic welfare of a society is largely a reflection of the better or worse performance of its critical infrastructures. Damage, disruption or destruction by low maintenance, natural disasters, terrorism, criminal activity or malicious behaviour, has a significant negative impact on the security of the society and the well-being of its citizens. This special session pretends to highlight the assessment and performance evaluation of these critical infrastructures, whether linked to transport, energy, health, or others, based on risk, vulnerability and resilience assessment made along the life-cycle of these assets using probabilistic methods.

**Special Session 4: May 13 (15:35-17:00 local time)**

**Uncertainty analysis and reliability assessment of timber structures**

**Organisers:** Leonardo G. Rodrigues (University of Minho), Jorge Branco (University of Minho)

Timber as a natural material presents a high variability in its mechanical properties, which contributes directly to an increase in the uncertainties associated with the response of timber structures. Therefore, it is crucial to develop studies that account for material variability as well as the uncertainties associated with loading. This session includes works related to the probabilistic modelling of timber mechanical properties, as well as crucial parameters used to model connections. Additionally, special focus will be given to reliability-based analyses that have been used for safety evaluation of timber structures.

# KEYNOTE SPEAKERS

Keynote Lectures will be given by five renowned experts on the topics of the IPW2020 and will address the most innovative findings of their ongoing work.

## Keynote Lecture 1: Wednesday, May 12 (09:15-10:00 local time)

### Probabilistic Seismic Risk Assessment of School Buildings



Ricardo Monteiro  
IUSS Pavia  
Italy

Ricardo Monteiro is Associate Professor of Structural Engineering at the University School of Advanced Studies IUSS Pavia, where he is also the Deputy Director of the Understanding and Managing Extremes (UME) Graduate School (formerly ROSE School), the Coordinator of the Italian (ROSE) and Deputy Coordinator of the Erasmus Mundus (MEEES) MSc programmes in Earthquake Engineering and Engineering Seismology. He is also Senior Advisor for the European Centre for Training and Research in Earthquake Engineering (EUCENTRE) in Italy.

He has been involved in a number of European Research Projects, such as LESSLOSS, SYNERG-G, NERA, SASPARM, mostly dedicated to the seismic vulnerability assessment of bridges and buildings. Recently, he has coordinated European-funded research projects on seismic risk in Europe, North Africa and the Middle East (ITERATE and INFRA-NAT). He has been the advisor of over 40 MSc and 8 PhD theses in the field of extreme events and co-authored over 100 scientific publications. He has teaching experience in both Italy and Portugal, where he qualified in Civil Engineering at the University of Porto. He then completed his PhD specializing in Earthquake Engineering, with a thesis on Probabilistic Seismic Assessment of RC Bridges.

## Keynote Lecture 2: Wednesday, May 12 (13:30-14:15 local time)

### Towards Climate Change Adaptation of Existing and New Deteriorating Infrastructure



Emilio Bastidas-Arteaga  
La Rochelle University  
France

Dr. Emilio Bastidas-Arteaga is Full Professor at La Rochelle University (France) since 2020 where he is associated to the Laboratoire des Sciences de l'Ingénieur pour l'Environnement (LaSIE). He was Associate Professor at the University of Nantes (France) from 2010 to 2020. His research work aims at providing robust stochastic frameworks to optimise design, inspection, and maintenance of ageing coastal and offshore structures under realistic environmental conditions. His track record of research achievements and publications counts with more than 150 scientific documents including one edited book on Climate Adaptation Engineering and 47 peer-reviewed journal papers.

Since 2009, he has been working on the assessment of consequences and adaptation of infrastructure and buildings subjected to climate change within the framework of national and international collaborations and research projects (INTERREG SIRMA 2019-22; ADAPTONS 2018-19; H2020 ClimatCon 2015-17; RI-ADAPTCLIM 2014-17). He has been and is also participating in several technical committees related to climate change and civil engineering: French Association for Normalisation (AFNOR, France), CEN/CENELEC Mandate 526 (European Commission), American Concrete Institute (ACI, USA), Joint Research Centre (JRC, European Commission), and the International Association for Bridge and Structural Engineering (IABSE, International).

**Keynote Lecture 3: Thursday, May 13 (08:30-09:15 local time)**

**Surrogate Models for Reliability Analysis and Reliability-based Design Optimization**



Bruno Sudret  
ETH Zurich  
Switzerland

Bruno Sudret is a professor of Risk, Safety and Uncertainty Quantification at ETH Zurich (Switzerland) since 2012. His teaching and research interests are computational methods for uncertainty quantification, surrogate modelling, reliability and sensitivity analysis, Bayesian approaches for model calibration and reliability-based design optimization. He received a MSc from the Ecole Polytechnique (France) in 1993, then a MSc and a PhD in civil engineering from the Ecole Nationale des Ponts et Chaussées (France) in 1996 and 1999, respectively. He has been working in the field of uncertainty quantification in engineering since 2000: first as a post-doctoral fellow at the University of Berkeley (California), then as a researcher at EDF R&D (the French world leader in nuclear power generation (2001-2008)). From 2008 to 2011 he was the Director of Research and Strategy at Phimeca Engineering.

Bruno Sudret has authored more than 300 publications including 90 journal papers and 13 book chapters, and has edited two books.

He is the recipient of the Jean Mandel Prize (France, 2005). He currently serves as Guest Editor in the journal Reliability Engineering and System Safety and also belongs to the Editorial Boards of Probabilistic Engineering Mechanics and Structural Safety.

**Keynote Lecture 4: Thursday, May 13 (13:30-14:15 local time)**

**Reliability Modelling and Probabilistic Design of Wind Turbines**



John D. Sørensen  
Aalborg University  
Denmark

John Dalsgaard Sørensen, from Aalborg University – Department of the Built Environment, is Professor in Structural Reliability. His main research fields are stochastic modelling, reliability assessment, probabilistic design, risk-based decision making for planning of inspections and Operation & Maintenance. Application areas are buildings, bridges, offshore structures and wind turbines.

Prof. Sørensen has published more than 300 technical papers and co-authored several books and reports. He is involved in several national and international research projects related to risk and reliability of wind turbines. He is also active in a number of standardization committees including Eurocodes, Basis of structural and geotechnical design and IEC 61400 on wind turbines. He is convener of the new IEC 61400-6 standard on wind turbines towers and foundations.

Further, Prof. Sørensen is past president of the JCSS (Joint Committee on Structural Safety).

Decision Analysis Applied to Natural Hazards



Herbert Einstein  
MIT  
USA

Herbert H. Einstein, Professor Civil and Environmental Engineering at the Massachusetts Institute of Technology, received his Dipl. Ing. and Sc. D. in Civil Engineering from ETH Zurich. His teaching and research areas are underground construction, rock mechanics and engineering geology.

Professor Einstein has been involved as an advisor, consultant and researcher in issues related to underground construction, rock mechanics and rock engineering and natural hazards, notably landslides, and in waste repository problems. He has been and is member of a number of national and international technical/scientific committees and advisory boards; he is also co-editor of the journal Rock Mechanics and Rock Engineering and member of the editorial board of Tunnelling and Underground Space Technology.

Professor Einstein is author or co-author of over 300 publications in his area of expertise. He was the recipient of a number of prestigious awards from international and national societies such as the Müller lecture of the International Society for Rock Mechanics and the “Outstanding Contributions to Rock Mechanics” award of the American Rock Mechanics Association. He also received several teaching awards from his Department and from the School of Engineering.

# DETAILED PROGRAMME

The IPW2020 includes a total of five keynote lectures and thirteen technical Sessions distributed through the three days of the Workshop, among which five belong to Special Sessions.

## Opening Session: Wednesday, May 12 (8:30-09:15 local time)

Welcome from:

- Representative of the Municipality of Guimarães;
- Dean of the School of Engineering from University of Minho: Pedro Arezes;
- Director of ISISE and Co-Chairman of IPW2020: Paulo B. Lourenço
- President of IPW: Dirk Proske;
- Co-Chairman of IPW2020: José C. Matos.

## Keynote Lecture 1: Wednesday, May 12 (09:15-10:00 local time)

**Chairs:** Dirk Proske and José C. Matos

Local time	ID	Presentation
09:15 09:50	113	Probabilistic Seismic Risk Assessment of School Buildings <i>Ricardo Monteiro</i>
09:50 10:00		Q&A Discussion

## Session 1: Wednesday, May 12 (10:20-11:45 local time)

**Risk assessment and management**

**Chairs:** Dirk Proske and Joaquim Tinoco

Local time	ID	Presentation
10:20 10:32	97	A Novel Analytical Method Set for Damage Control and Care-process Management by the Cathedral of Milan <i>Francesco Canali, Lorenzo Cantini, Anthonoula Konsta and Stefano Della Torre</i>
10:32 10:44	112	Construction Risk Management in Portugal – Identification of the Tools/techniques and Specific Risks in the Design and Construction Phases <i>António J. Marinho and João P. Couto</i>
10:44 10:56	12	Discussion of the Number of Risk Classes for Risk Based Maintenance <i>Dirk Proske and David Tschan</i>
10:56 11:08	11	Estimation of the Global Health Burden of Structural Collapse <i>Dirk Proske</i>
11:08 11:20	24	Parameter Uncertainties in Flow Rate and Velocity Analysis of Heavy Rain Events <i>Axel Sauer and Regine Ortlepp</i>
11:20 11:32	86	Rockburst Risk Assessment Based on Soft Computing Algorithms <i>Joaquim Tinoco, Luis Ribeiro e Sousa, Tiago Miranda and Rita Leal e Sousa</i>
11:32 11:45		Q&A Discussion

<b>Keynote Lecture 2: Wednesday, May 12 (13:30-14:15 local time)</b>		
<b>Chairs:</b> Alfred Strauss and Rui A. Silva		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
13:30 14:05	114	Towards Climate Change Adaptation of Existing and New Deteriorating Infrastructure <i>Emilio Bastidas-Arteaga</i>
14:05 14:15	Q&A Discussion	

<b>Session 2A: Wednesday, May 12th (14:15-15:15 local time)</b>		
<b>Novel decision-making frameworks</b>		
<b>Chairs:</b> Alfred Strauss and Rui A. Silva		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
14:15 14:27	91	Development of Culvert Risk Condition Evaluation for Decision-making Within Road Infrastructure Management <i>Fernando Sousa, Sara Dias, José C. Matos, and Aires Camões</i>
14:27 14:39	77	Prediction of Concrete Breakout Strength of Single Anchors in Shear <i>Oladimeji B. Olalusi, and Panagiotis Spyridis</i>
14:39 14:51	107	Probabilistic Modeling of Impact of Vehicles on the Road Furniture <i>Alfred Strauss, Panagiotis Spyridis, Ivan Zambon et al.</i>
14:51 15:03	41	Study on the Accuracy of Chloride Determination Methods and their Predictions <i>Fritz Binder, Stefan L. Burtcher and Alfred Strauss</i>
15:03 15:15	Q&A Discussion	

<b>Session 2B: Wednesday, May 12th (14:15-15:15 local time)</b>		
<b>Probabilistic tools for probabilistic vulnerability and lifetime assessment of infrastructure in the context of climate change &amp; natural hazards in Atlantic area</b>		
<b>Chairs:</b> Vikram Pakrashi and Mário Coelho		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
14:15 14:27	111	Dynamic Response Equivalence of a Scaled Bridge Model due to Vehicular Movement <i>Paul Cahill and Vikram Pakrashi</i>
14:27 14:39	118	Life-Cycle Cost Analysis of a Viaduct Considering Uncertainties on the Interventions Plan <i>Carlos Santos, Mário Coelho, Monica Santamaria et al.</i>
14:39 14:51	119	Stochastic Carbon Dioxide Forecasting Model for Concrete Durability Applications <i>Bassel Habeeb, Emilio Bastidas-Arteaga, Helena Gervásio and Maria Nogał</i>
14:51 15:03	117	The Impact of Clustering in the Performance Prediction of Transportation Infrastructures <i>Carlos Santos, Sérgio Fernandes, Mário Coelho, and José C. Matos</i>
15:03 15:15	Q&A Discussion	

<b>Session 3A: Wednesday, May 12th (15:35-17:00 local time)</b>		
<b>Resilience, robustness, and redundancy of systems</b>		
<b>Chairs:</b> Panagiotis Spyridis and Mário Coelho		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
15:35 15:47	100	A DC Optimal Power Flow Approach to Quantify Operational Resilience in Power Grids <i>Zarif Ahmet Zaman and Edoardo Patelli</i>
15:47 15:59	61	Establishment of Suitable General Probabilistic Model for Shear Reliability Analysis <i>Oladimeji Benedict Olalusi and Panagiotis Spyridis</i>
15:59 16:11	3	Fragility Curves for Fire Exposed Structural Elements through Application of Regression Techniques <i>Ranjit K. Chaudhary, Ruben Van Coile and Thomas Gemay</i>
16:11 16:23	25	Location Dependency on Resilience and Material Intensity of an Office Building Keeping an Eye on Seismic Zone Implications <i>Regine Ortlepp and Mahar A. Gul</i>
16:23 16:35	2	Probabilistic Characterization of the Axial Load Bearing Capacity of a Concrete Column Exposed to the Standard Fire <i>Balša Jovanović and Ruben Van Coile</i>
16:35 17:00	Q&A Discussion	

<b>Session 3B: Wednesday, May 12th (15:35-17:00 local time)</b>		
<b>Fundamentals and application of probability theories</b>		
<b>Chairs:</b> André Orcesi and Rui A. Silva		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
15:35 15:47	21	A Quick Criterion for Calculating Waiting Phenomena at Intersections <i>Raffaele Mauro, Marco Guerrieri and Andrea Pompigna</i>
15:47 15:59	78	Assessment of Design Concepts for Post-Installed Punching Shear Retrofitting <i>Oladimeji B., Puneh Mowlavi, Nikolaos Mellios and Panagiotis Spyridis</i>
15:59 16:11	80	At Issue: The Gaussian Autocorrelation Function <i>Marc A. Maes, Karl Breitung and Markus R. Dann</i>
16:11 16:23	88	Bridge Case Studies on the Assignment of Partial Safety Factors for the Assessment of Existing Structures <i>André Orcesi, Vazul Boros, Marija Kušter Marić et al.</i>
16:23 16:35	45	Cumulative Failure Probability of Deteriorating Structures: Can it Drop? <i>Ronald Schneider and Daniel Straub</i>
16:35 17:00	Q&A Discussion	

<b>Keynote Lecture 3: Thursday, May 13 (08:30-09:15 local time)</b>		
<b>Chairs:</b> Emilio Bastidas-Arteaga and Abel Henriques		
<b>Local time</b>	<b>Presentation</b>	
08:30 09:05	Surrogate Models for Reliability Analysis and Reliability-Based Design Optimization <i>Bruno Sudret</i>	
09:05 09:15	Q&A Discussion	



<b>Session 4: Thursday, May 13th (09:15-10:00 local time)</b>		
<b>Climate change and loading uncertainties</b>		
<b>Chairs:</b> Emilio Bastidas-Arteaga and Yina F. M. Moscoso		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
09:15 09:27	98	Accounting for Joined Probabilities in Nation-wide Flood Risk Profiles <i><u>Ferdinand Diermanse</u>, Joost V.L. Beckers, Cathy Ansell and Antoine Bavandi</i>
09:27 09:39	17	Comparison of Measured and Simulated Traffic Loading Based on BWIM Data from the Millau Viaduct <i><u>Marcel Nowak</u>, Franziska Schmidt and Oliver Fischer</i>
09:39 09:51	29	Uncertainty Assessment in Building Physics Related Problems Using Stochastic Finite Element Method <i><u>Witold Grymin</u> and Marcin Koniorczyk</i>
09:51 10:00	Q&A Discussion	

<b>Session 5A: Thursday, May 13th (10:20-11:45 local time)</b>		
<b>Fundamentals and application of probability theories</b>		
<b>Chairs:</b> Raquel Menezes and Elisabete Teixeira		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
10:20 10:32	92	FORM/SORM, SS and MCMC: A Mathematical Analysis of Methods for Calculating Failure Probabilities <i><u>Karl Breitung</u></i>
10:32 10:44	109	International Codes in the Prediction of Load-bearing Capacity of Slender Columns <i><u>Alfred Strauss</u>, Neryvaldo Galvão, José C. Matos et al.</i>
10:44 10:56	8	Fractile Based Sampling Procedure for the Effective Analysis of Engineering Structures <i><u>Alfred Strauss</u>, Beatrice Belletti and Thomas Zimmermann</i>
10:56 11:08	106	Implementation of Reliability methods in a New Developed Open-source Software Library <i><u>Jan Philip Schulze-Ardey</u>, Tânia Feiri, Josef Hegger and Marcus Ricker</i>
11:08 11:20	20	Model Updating With Reduced Experimental Data <i><u>Pierre Beaurepaire</u></i>
11:20 11:32	103	Long Term Evaluation of the Structural Reliability of an Existing Concrete Prestressed Bridge <i><u>Tommaso Donolato</u>, Neryvaldo Pereira and José C. Matos</i>
11:32 11:45	Q&A Discussion	

<b>Session 5B: Thursday, May 13th (10:20-11:45 local time)</b>		
<b>Reliability in geotechnical engineering</b>		
<b>Chairs:</b> Timo Schweckendiek and Bram van den Eijnden		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
10:20 10:32	19	An Efficient Solution for Reliability Analysis Considering Random Fields – Application to an Earth Dam <i>Xiangfeng Guo, Daniel Dias and Qiuqing Pan</i>
10:32 10:44	18	Inherent Variability of Geotechnical Properties for Finnish Clay Soils <i>Monica S. Löfman and Leena K. Korkiala-Tanttu</i>
10:44 10:56	42	Investigation of Parameter Uncertainties Inherent to the Geotechnical Design of Bank Revetments at Inland Waterways <i>Julia Sorgatz and Joan Kayser</i>
10:56 11:08	76	Probabilistic FEM-Analysis for the Retaining Wall of a Deep Excavation at SLS <i>Alexandra Ene, Timo Schweckendiek and Horatiu Popa</i>
11:08 11:20	10	Probability of Flooding due to Instability of the Outer Slope of a Levee <i>Anton W. van der Meer, Ana Teixeira, Arno P.C. Rozing and Wim Kanning</i>
11:20 11:32	22	Risk-Driven Decision Making Within the Observational Method: Case Study Based on the New International Airport of Mexico City <i>Antonios Mavritsakis, Martin de Kant and Joost Van der Schrier</i>
11:32 11:45	Q&A Discussion	

<b>Keynote Lecture 4: Thursday, May 13 (13:30-14:15 local time)</b>		
<b>Chairs:</b> Pietro Croce and Hélder S. Sousa		
<b>Local time</b>	<b>Presentation</b>	
13:30 14:05	Reliability Modelling and Probabilistic Design of Wind Turbines <i>John Dalsgaard Sørensen</i>	
14:05 14:15	Q&A Discussion	

<b>Session 6A: Thursday, May 13th (14:15-15:15 local time)</b>		
<b>Fundamentals and application of probability theories</b>		
<b>Chairs:</b> Pietro Croce and Leonardo G. Rodrigues		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
14:15 14:27	120	Probabilistic-based Consequence Analysis for Transport Networks <i>Donya Hajjalizadeh, Chia Sadik and Boulent Imam</i>
14:27 14:39	68	Evaluation of Partial Safety Factors for the Structural Assessment of Existing Masonry Buildings <i>Pietro Croce, Maria L. Beconcini, Paolo Formichi et al.</i>
14:39 14:51	30	Stochastic Simulation of Clay Brick Masonry Walls with Spatially Variable Material Properties <i>Dominik Müller, Tilo Proske and Carl-Alexander Graubner</i>
14:51 15:15	Q&A Discussion	

<b>Session 6B: Thursday, May 13th (14:15-15:15 local time)</b>		
<b>Risk assessment and performance evaluation of critical infrastructures</b>		
<b>Chairs:</b> José C. Matos and Hélder S. Sousa		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
14:15 14:27	116	An Overview of Performance Prediction Models for Railway Track Assets in Europe <i><u>Maria José Morais</u>, Hélder S. Sousa and José C. Matos</i>
14:27 14:39	94	An Adaptive Subset Simulation Algorithm for System Reliability Analysis with Discontinuous Limit States <i><u>Jianpeng Chan</u>, Iason Papaioannou and Daniel Straub</i>
14:39 14:51	35	A Reliability Based Crack Propagation Model for Reinforced Concrete Bridge Piers Subject to Vehicle Impact <i><u>Suman Roy</u> and Andrew Sorensen</i>
14:51 15:03	36	Energy Based Model of Vehicle Impacted Reinforced Bridge Piers Accounting for Concrete Contribution to Resilience <i><u>Suman Roy</u> and Andrew Sorensen</i>
15:03 15:15	Q&A Discussion	

<b>Session 7A: Thursday, May 13th (15:35-17:00 local time)</b>		
<b>Uncertainty analysis and reliability assessment of timber structures</b>		
<b>Chairs:</b> Jorge Branco and Leonardo G. Rodrigues		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
15:35 15:47	65	Application of Fragility Analysis to Timber-Framed Structures for Seismic and Robustness Assessments <i><u>Leonardo G. Rodrigues</u>, Jorge M. Branco, Luis A. C. Neves and André R. Barbosa</i>
15:47 15:59	69	Influence of an In-situ Inspection on the Reliability Analysis of an Ancient Timber Roof <i><u>Leonardo G. Rodrigues</u> and Hélder S. Sousa</i>
15:59 16:11	58	Reliability Analysis of Timber Elements Under Different Load Types and Identification of Critical Scenarios for the Evaluation of Existing Structures. <i><u>Maria Loebjinski</u>, Wolfgang Rug and Hartmut Pasternak</i>
16:11 16:23	121	Statistical Dependence Investigation Related to Dowel-type Timber Joints <i><u>Caroline D. Aquino</u>, Leonardo G. Rodrigues, Wellison S. Gomes et al.</i>
16:23 16:35	83	Uncertainty Associated to Regression Models Used for Assessing the Stiffness of Structural Timber Elements <i><u>José Saporiti Machado</u></i>
16:35 17:00	Q&A Discussion	

<b>Session 7B: Thursday, May 13th (15:35-17:00 local time)</b>		
<b>Risk assessment and performance evaluation of critical infrastructures</b>		
<b>Chairs:</b> José C. Matos and Hélder S. Sousa		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
15:35 15:47	95	Identification of Risk Management Models and Parameters for Critical Infrastructures <i>Oscar J. Urbina, Elisabete R. Teixeira and José C. Matos</i>
15:47 15:59	89	Reliability Assessment of Oil and Gas Pipeline Systems at Burst Limit State under Active Corrosion <i>Ram K. Mazumder, Abdullahi M. Salman and Yue Li</i>
15:59 16:11	90	Risk Assessment of a Railway Bridge Subjected to a Multi-hazard Scenario. <i>João Fernandes, Monica Santamaria, José C. Matos et al.</i>
16:11 16:23	108	Risk Assessment of Road Infrastructures as Key for Adaptability Measures Selection <i>Érica L. Arango, Hélder S. Sousa and José C. Matos</i>
16:23 16:35	104	Vulnerability Assessment of Aging Levees with WINGS and Interval Arithmetic <i>Francesca Marsili, Jörg Bödefeld, Lukas Weber and Maryam Ghadami</i>
16:35 17:00	Q&A Discussion	

<b>Session 8: Friday, May 14th (08:30-09:15 local time)</b>		
<b>Fundamentals and application of probability theories</b>		
<b>Chairs:</b> Roman Lenner and Daniel V. Oliveira		
<b>Local time</b>	<b>ID</b>	<b>Presentation</b>
8:30 8:42	43	Integration of the Analysis of the Error of Geometric Dimensions Modeled with a Probabilistic Approach. <i>Marc Gille, Pierre Beaurepaire, Fabien Taghon et al.</i>
8:42 8:54	75	Numerical Modeling of an Extrusion-based Concrete Printing Process Considering Spatially and Temporarily Varying Material and Process Parameters <i>Albrecht Schmidt, Meron Mengesha, Luise Göbel et al.</i>
8:54 9:06	105	Probabilistic Methods For Code Calibration Exemplified For The Punching Shear Resistance Model Without Shear Reinforcement. <i>Tânia Feiri, Marcus Ricker, Jan Philip Schulze-Ardey and Josef Hegger</i>
9:06 9:18	32	Semi-empirical Based Response Surface Approach for Reliability Evaluation of Steel Plates with Random Fields of Corrosion. <i>Angelo P. Teixeira and Carlos Guedes Soares</i>
9:18 9:30	79	Spatial Variability of Rebar Corrosion and Performance Evaluation of Corroded RC Structures Using Probabilistic Analysis and Finite Element Method <i>Mitsuyoshi Akiyama, Dan M. Frangopol and Mingyang Zhang</i>
9:30 9:42	101	Stochastic Degradation Model of Concrete Bridges Using Data Mining Tools <i>Yina F. M. Moscoso, Monica Santamaria, Hélder S. Sousa et al.</i>
9:42 10:00	Q&A Discussion	

Keynote Lecture 5: Friday, May 14 (10:20-11:05 local time)		
Chairs: Roman Lenner and Daniel V. Oliveira		
Local time	ID	Presentation
10:20 10:55	115	Decision Analysis Applied to Natural Hazards <i>Herbert H. Einstein and Rita L. Sousa</i>
10:55 11:05		Q&A Discussion
Closing Session: Friday, May 14 (11:05-11:25 local time)		
Closing ceremony and announcement of the winner of the Young Presenter Award		
<ul style="list-style-type: none"> <li>➤ President of the Scientific Committee of IPW2020: Daniel V. Oliveira;</li> <li>➤ Co-Chairman of IPW2020: Roman Lenner;</li> <li>➤ President of IPW: Dirk Proske.</li> </ul>		

# YOUNG PRESENTER AWARD

The IPW2020 is happy to announce the newly created “Young Presenter Award” to be awarded to the best young presenter attending the workshop.

Any registered author presenting a paper and up to 35 years old (the reference date is December 31, 2021) can apply for this award. Upon the email contact from the IPW2020 Secretariat, eligible presenters willing to apply for the IPW2020 Young Presenter Award should inform the Secretariat about their interest and submit proof of age. Eligible presenters who fail to do so will not be considered for this award.

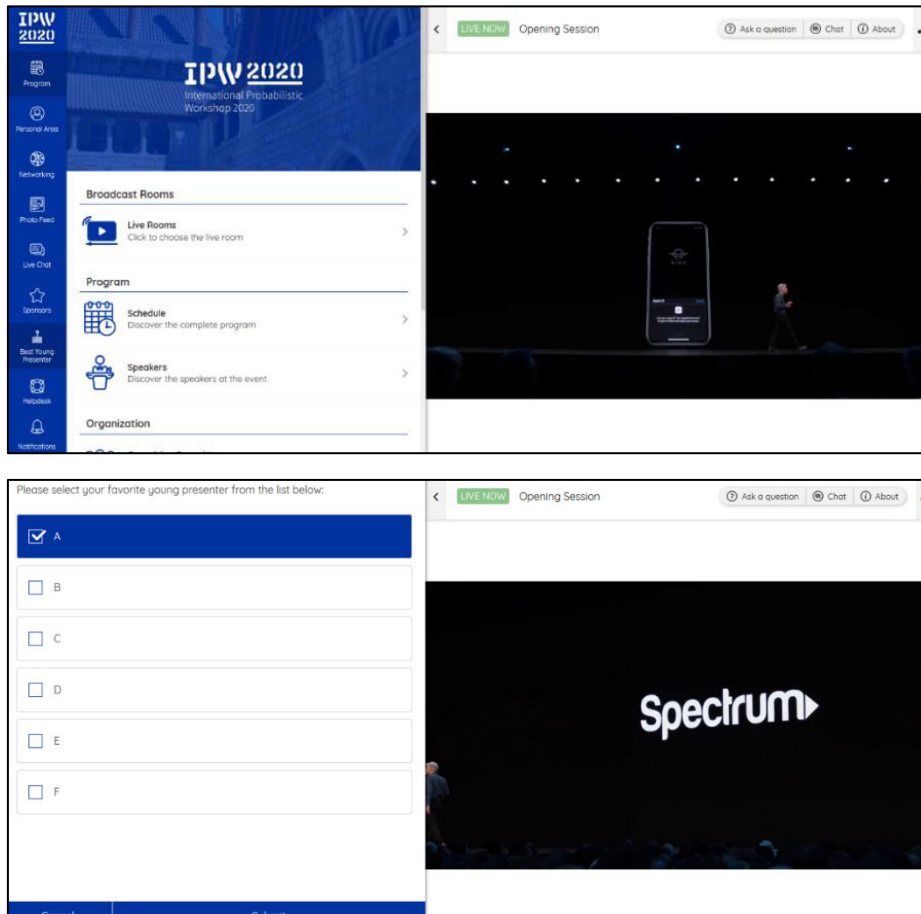
The award winner will be selected by all registered participants that may vote for the best presenter (considering the quality of presentation, discussion, and contents) through the IPW2020 streaming. In the unlikely event of a tie, the award winner is decided by the Organizing Committee of IPW2020.

The IPW2020 Young Presenter Award is composed of a Diploma and free registration of the award winner at the IPW 2022, which will take place in Stellenbosch, South Africa, March 16-17, 2022.

The award winner will be announced during the closing session of the IPW2020 Workshop.

## How to vote?

The IPW2020 participants will be invited to vote on the best Young Presenter through the event platform. Each presentation by an eligible participant is eligible for a single vote, which can be changed until 10 min after the end of Session 8 on May 14 (Friday). To vote, click on the Best Young Presenter button and select your favourite candidate among the available ones. The voting process is illustrated in the images below.



# CERTIFICATE OF ATTENDANCE

Certificate of attendance will be sent by email after the Workshop.

## SOCIAL ACTIVITIES

Unfortunately, the worldwide COVID-19 pandemic came to change the way we socialise and to limit our mobility in the process of learning about other cultures and places. These values are key aspects of events like the IPW2020, which, due to the online format adopted, cannot be promoted in the most pleasant manner. Nevertheless, the IPW2020 will have two social moments that aim at letting you learn a little bit more about the city of Guimarães (host city of the IPW2020) and the Portuguese Culture.

The first social moment consists of a small video about Guimarães, which is a city of medieval origin and is listed as a World Heritage site by UNESCO since 2001. The video highlights the points of interest and the most attractive events of the city.

The second moment consists of a song entitled “A Nossa Voz” by Mariza, who is a well-known international singer of contemporary Fado. The song is addressed to “our voice”, which sings for hope and the determination to overcome the current difficulties, and shows us other ways to be together.

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