The British Society for Strain Measurement

8th POSTGRADUATE EXPERIMENTAL MECHANICS (PGEM) CONFERENCE

2 – 3 May 2024

National Physical Laboratory, Teddington, London, UK

CONFERENCE PROGRAMME

The BSSM PGEM conference showcases work by PhD/MPhil/MSc students in the field of engineering measurement and experimental techniques in stress, strain, and vibration analysis.

Welcome to PGEM 2024

Welcome to the 8th BSSM Postgraduate Experimental Mechanics conference! As part of our remit as the interface between industry, academia and the wider engineering community, the BSSM is actively engaging with the younger experimental mechanics community to ensure that knowledge and experience is shared. We hope you'll find the conference a friendly environment to share your work, make new contacts and develop a network which you'll be able to build on in future events. Thank you to all the presenters who have submitted very interesting abstracts which are sure to build the foundations of a successful conference and a strong competition!

Dr Ksenija Dvurecenska, PGEM chair

Ksenija is a lecturer in the Department of Mechanical and Aerospace Engineering at the University of Liverpool and a member of the Structural Materials and Mechanics research group. Her research focuses on quantitative validation methodologies, which she has so far explored in the nuclear energy and aerospace sectors. She was a recipient of the National Nuclear Laboratory Chief Scientist Award for the best paper in 2018 resulting from an NNL-university collaboration as part of her PhD. The challenges she is addressing with her research are effective use of physical measurements in the validation process, standardisation of the validation methods, and interpretation of the validation outcomes. This is with the aim to establish confidence in computational models and support decisions based on the predictions of the high-fidelity models. She joined the BSSM Conference Committee in 2022, which is responsible for the Postgraduate and Annual BSSM Conferences.

Dr Hari Arora, BSSM Chair

Hari is an Associate Professor in Biomedical Engineering at Swansea University. He did his undergraduate and postgraduate studies 2004-2012 in the Department of Mechanical Engineering at Imperial College London, completing computational and experimental projects related to impact, nonlinear material behaviour and fracture. In 2013, he was awarded a Research Fellowship to study Lung Mechanics in the Department of Bioengineering, before moving to Swansea in 2017. He currently leads the Biomedical Engineering Simulation and Testing Lab at Swansea University where his research focusses on soft tissues, tissue phantoms, medical devices and personalised modelling methods. Techniques such as digital image correlation, particle image velocimetry, high-speed photography, mechanical testing and various manufacturing methods are used routinely. Working within the Biomedical Engineering Simulation and Testing Lab, and collaborating with the Computational Biomechanics Group and experts across the Zienkiewicz Institute for Modelling, Data and AI, he uses computationally-driven approaches to deliver engineering solutions supported by targeted experimental measurements. He has served on the National Committee of the BSSM since 2016, co-Chaired the Conference Committee (2019-2022) and is the current BSSM Chair.

PGEM 2024 sponsors

We would like to thank this year's conference sponsors for their support!

ZEISS UK

ZEISS UK are supporting this year's PGEM conference.

Instron

Instron Dynamic Systems are sponsoring this year's 'Best Presentation Competition'. The competition will run during the conference based on peer-assessed judging by all attendees. Prizes will be awarded to the winner and runners up as follows:

1st prize: £125

2nd prize: £75

3rd prize: £50

British Society for Strain Measurement (BSSM)

Early Careers

The BSSM offers a number of exciting opportunities for early career practitioners involved in experimental mechanics and related disciplines including training, workshops and conferences that contribute to continued professional development and support your career advancement and aspirations.

We offer discounted Student membership, and as a member there are many opportunities to get involved in the Society such as joining a committee, by signing up to be a designated BSSM Early Career representative or attending or even organising a workshop. Getting involved provides many opportunities to connect with colleagues from academia and industry who are already members and join the enthusiastic network of BSSM Early Career scientists and engineers. These apply to both industrial and academic career paths.

Visit https://www.bssm.org/early-careers/ to find out more.

Forthcoming events

Seminar on High Temperature Testing of Materials: The Challenges in Characterising Material Behaviour
28th June 2024
Open University, Milton Keynes, UK

Workshop on The Measurement of Residual Stress using Laboratory Based X-Ray Diffraction Instruments - Follow up
19th November 2024
National Physical Laboratory, Teddington, UK

18th International Conference on Advances in Experimental Mechanics
3rd-5th September 2024
University of Liverpool, UK

Young Stress Analyst Competition YSA24
4th September 2024
University of Liverpool, UK

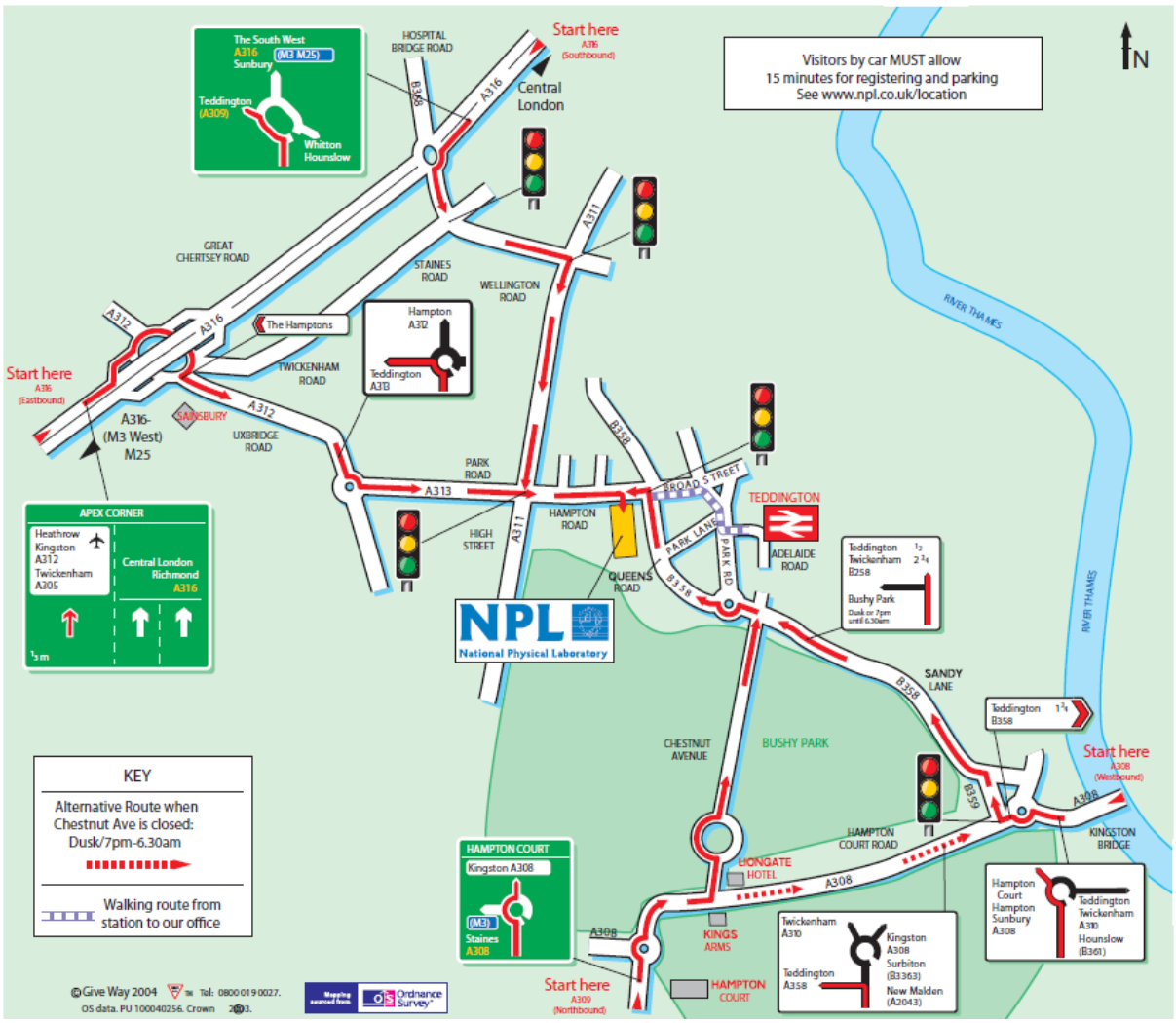
Visit https://www.bssm.org/events/ for more information.

BSSM team

We would like to express our thanks to Amanda Boaler and Biana Gale of BSSM for their continued assistance and support in the organisation of this year's PGEM conference.

Venue information

National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW



Further information about the venue and how to get there: www.npl.co.uk/find-us

Parking: Limited parking is available on site. Please come to the Hampton Road entrance of NPL and park in the visitors car park by reception. Then come into reception to sign in and collect your badge, after which you will be issued a parking permit. You may be asked to move your car but a map and instructions will be provided.

We would like to express our thanks to National Physical Laboratory and their staff for hosting us and supporting the running of the PGEM this year.

NPL

National Physical Laboratory

Conference programme

Day 1 - Thursday 2nd May

11:20-11:30	Registration
11:30-11:50	Welcome and introduction to the conference
11:50-12:50	Research presentations 1
11:50-12:10	Suitability of 3D printed blades for monitoring unsteady loads on lab-scale tidal stream turbines. *Selina Brinkmann, University of Oxford*
12:10-12:30	Variable amplitude fatigue testing of large scale high strength steel cast node tubular connections. *John Harris, University of Strathclyde*
12:30-12:50	Low Cycle Fatigue Behaviour of OFHC Copper at Room Temperature & High Temperature using Digital Image Correlation. *Wan Maisarah, University of Bristol*
12:50-13:50	Lunch
13:50-14:20	Invited presentation 1
	From Airframes to Tokamaks: My Journey with Experimental Mechanic. Khurram Amjad, UK Atomic Energy Authority
14:20-15:00	Research presentations 2
14:20-14:40	Comparing digital image correlation and strain gauges for determining the mechanical performance of natural fibre composites at elevated temperatures. *Owen Tyley, University of Bristol*
14:40-15:00	Deep Learning in DIC: A Novel Architecture for Improved Displacement and Strain measurement. *Yash Kulthe, University of Surrey*
15:00-15:20	Tea/coffee break
15:20-16:20	Research presentations 3
15:20-15:40	An investigation into the effect of strain localisation on forged β-annealed Ti-6Al-4V. *Patrick Curran, University of Manchester*
15:40-16:00	Probing the ductile-to-brittle transition (DBT) in BCC fusion materials. *Florence Goodrich, University of Manchester*
16:00-16:20	X-ray phase contrast strain imaging using edge illumination. *Carlo Peiffer, University College London*
16:20-16:30	Close of conference day one

Day 2 - Friday 3rd May

09:30-09:40	Introduction to Day 2
09:40-10:40	Research presentations 4
09:40-10:00	Mechanical Energy Absorption of Metal-Organic Frameworks. *Ali Siwji, University of Birmingham*
10:00-10:20	Searching for Elusive Solitons: Optical Detection of Strain Waves Generated by Pulsed Laser Ablation in Acrylic Bars. *Jacob Vizor, Loughborough University*
10:20-10:40	Identification of Appropriate Specimen Geometry for Novel High-Rate Fracture Experimentation. *Ben Sargeant, Imperial College London*
10:40-10:55	Tea/coffee break
10:55-11:25	Invited presentation 2 Navigating my route from academia to industry. Emily Rolfe, Airbus UK
11:25-12:05	Research presentations 5
11:25-11:45	Shear failure of adhesively bonded composite joints at Cryogenic Temperatures. *David Brearley, University of Bristol*
11:45-12:05	Investigation into testing approaches for material characterisation of filament-wound components for hydrogen storage. *Jordan Forbes-Thomas, University of Bristol*
12:05-13:05	Lunch
13:05-14:05	Invited presentation 3 and Activity The Science of Storytelling Hannah Little, University of Liverpool
14:05-14:35	Awards and Close of conference

Research presentation chairs:

Sessions will be co-chaired between the student attendees / academics. **Please let us know if you wish to chair a session of research presentations.** Guidance will be provided throughout the conference.

Invited presentations

From Airframes to Tokamaks: My Journey with Experimental Mechanics.

Dr Khurram Amjad
Senior Fusion Technologist – full-field cryo-mechanical testing lead
UK Atomic Energy Authority

In this talk, I will share my journey from academia to a government research organization, focusing on my experience of working on various aerospace industry-funded projects spanning computational model validation, damage characterisation in materials and structural health monitoring. I will also touch on the importance of nuclear fusion as a source of clean, sustainable energy and will provide an overview of the exciting research I get to perform at the UK Atomic Energy Authority.

Dr Khurram Amjad obtained his PhD from the University of Liverpool in 2017, he then worked as post-doctoral research associate for four years on various aerospace industry funded projects before joining the UK Atomic Energy Authority (UKAEA) in 2022. At UKAEA, he is leading the development full-field mechanical testing capabilities at cryogenic temperatures. His research is focused on the characterisation of advanced structural materials and components in challenging environments using full-field techniques such as digital image correlation and infrared thermography.

Navigating my route from academia to industry.

Dr Emily Rolfe
Structures Test: Advanced Measurement Specialist
Airbus UK

Since finishing my PhD in 2019 I've worked in three different companies as I searched for the right role for me. I want to share my experiences, the highs and the lows, and the factors that influenced my decisions. Engineering chartership was never on my radar as a PhD student, however, I'll discuss why I think it's worth being aware of particularly for those considering entering industry. Along my journey I've had the opportunity to perform some exciting experiments which I will share including: explosive blast trials, hydrogen pressure vessel burst tests, gas gun impact tests and I'm currently working towards a full-scale wing failure test.

Emily Rolfe joined the Structures Test team at Airbus in January 2023. She is currently focussing on optimising multiple large-volume Digital Image Correlation (DIC) systems in preparation for a full-scale static wing test. Prior to joining Airbus, Emily worked at the National Composites Centre instrumenting and testing small components and coupons using a variety of experimental mechanics techniques. The work was mainly focussed on composites for use in hydrogen storage vessels and pipes. Emily obtained her PhD from Imperial College in 2019, with research on the blast performance of composite sandwich structures. High-speed DIC was the main measurement technique she used, supplemented by strain gauges and pressure gauges. Emily's interest in DIC started during a summer internship at Rolls-Royce in 2013 where she was tasked with researching the latest non-contact measurement methods.

The science of storytelling.

Dr Hannah Little
Lecturer in Communication and Media
University of Liverpool

Storytelling lies at the heart of effective science communication and is one of the oldest, most powerful, and universal tools that humans use to understand the world around us. This makes storytelling a highly useful technique for STEM communication, both for peer-to-peer communication and for other audiences. In this session, Hannah will introduce us to the basics of making stories structured, memorable, and effective for STEM communication. She will lead us through a live experiment to illustrate the cognitive biases associated with storytelling based on experiments from her own research and give participants a chance to turn their own projects into stories worth remembering.

Dr Hannah Little is a Lecturer in Communication and Media at the University of Liverpool and was previously a Senior Lecturer in the Science Communication Unit at UWE Bristol. Her research uses tools from cultural evolution, linguistics, and cognitive science to uncover best practice for science communication. Outside of academia, she has worked professionally in science communication in the UK for more than a decade and has well-received appearances at the British Science Festival, TEDx and on BBC Radio 4.

Abstracts

Abstracts submitted prior to the PGEM conference will be available online at the conference webpage within the BSSM website. Instructions on how to access these abstracts will be emailed to delegates after the conference.