



**IUTAM SYMPOSIUM ON  
FRONTIERS OF SOLID MECHANICS FOR ENERGY  
TRANSITION**

**1 – 4 July 2024**

King's College, University of Aberdeen, Aberdeen, UK.

**SYMPOSIUM PROGRAMME**

**Monday 1<sup>st</sup> July – Morning Session**

- 08:00 Registration
- 09:30 Welcome / Opening
- Chair: Amir Siddiq** (*Univ. of Aberdeen*)
- 09:45 Hydrogen induced fast fracture. (Keynote)  
*Vikram S. Deshpande* (*Univ. of Cambridge, UK*), *S.S. Shishvan*, *G. Csanyi*
- 10:35 Atomistic mechanisms of ingress and egress of hydrogen through iron surfaces.  
*Eszter Varga-Umbrich*, *Siamak S. Shishvan*, *Angelos Michaelides*, *Vikram Deshpande*, **Gábor Csányi** (*Univ. of Cambridge, UK*)
- 11:05 Coffee Break
- 11:30 The Influence of Iron Oxide Corrosion of the Hydrogen Embrittlement and Uptake in Vintage Pipeline Steel.  
*Anthony Reilly* (*Univ. of Strathclyde, UK*), *Fiona Sillars*, *Julia Race*, *Tiziana Marrocco*, *Maidor Olasolo*
- 12:00 Towards a Virtual Hydrogen Lab: electro-chemo-mechanical phase field-based models for hydrogen-material interactions  
*Emilio Martínez- Pañeda* (*Univ. of Oxford, UK*)
- 12:30 Lunch Break

## Monday 1<sup>st</sup> July – Afternoon Session

**Chair: Maria Kashtalyan** (*Univ. of Aberdeen*)

- 13:30 Materials and condition monitoring requirements for more cost-effective wind turbines in the long term (Keynote)  
*Chris Spruce* (*bp, UK*)
- 14:20 Augmented Twins for Wind Energy Assets: Monitoring for Resilience and Data-driven Decision Support  
*Eleni Chatzi* (*ETH, Zurich*)
- 14:50 On Approaches to Utilize Empirical Mode Decomposition in Condition Monitoring  
*Mikko Suominen* (*Aalto Univ., Finland*), *Ahmad BahooToroody*, *Osiris Valdez Banda*
- 15:20 Coffee Break
- 15:45 Digital twin technology for safety-critical systems in energy transition  
*Henry Tan* (*Univ. of Aberdeen, UK*)
- 16:15 Neural Constitutive Law for Digital Twin  
*Jingzhe Pan*, *Ran He* (*Univ. of Leicester, UK*), *Peter Polak*, *Venkat Ghantasala*, *Baber Saleem*, *Xiaoxia Yu*
- 16:45 Close
- 18:30 Welcome Reception  
**Aberdeen Maritime Museum, Shiprow, Aberdeen AB11 5BY**

## Tuesday 2<sup>nd</sup> July – Morning Session

**Chair: Mehmet Kartal** (*Univ. of Aberdeen*)

- 09:30 Durability in Next Generation Polymer Electrolyte Membrane Fuel Cell.  
(Keynote)  
*Tsuyohiko Fujigaya* (*Kyushu Univ., Japan*)
- 10:20 Thermomechanical parametric analysis of a tubular solid oxide electrolysis cell in high temperature conditions  
*Victoria Kurushina* (*Robert Gordon Univ., UK*), *Anil Prathuru*, *Mamdud Hossein*, *Ajith Soman*, *Bahman Amini Horri*, *Qiong Cai*, *Nadimul Faisal*
- 10:50 Coffee Break
- 11:15 Experimental identification of strain field evolution in cryogenic temperatures in materials for hydrogen application  
*Jakub Tabin* (*Polish Academy of Sciences, Poland*), *Adam Brodecki*, *Zbigniew Kowalewski*
- 11:35 Hydrogen energy system by using renewable energy.  
*Tatsuoki Kono* (*Univ. of Tokyo, Japan*)
- 12:05 Hydrogen storage versus lithium ion battery: is there a clear winner?  
*Norman A. Fleck* (*Univ. of Cambridge, UK*)
- 12:35 Lunch Break

## Tuesday 2<sup>nd</sup> July – Afternoon Session

**Chair: Srinivas Sriramula** (*Univ. of Aberdeen*)

- 13:30 Key mechanisms determining wind turbine blade life and hydrogen pressure vessel damage tolerance: insights from multiscale computed tomography.  
(Keynote)  
*Mark Spearing* (*Univ. of Southampton, UK*), *Ian Sinclair*, *Mark N. Mavrogordato*
- 14:20 The effect of insufficient cooling control on the lifetime of wind turbine yaw brake callipers (YBC).  
*Obey Suleyman* (*Univ. of Strathclyde, UK*), *Tiziana Marrocco*, *Fiona Sillars Mairder Olasolo*
- 14:50 Damage tolerant wind turbine rotor blades.  
*Bent F. Sorensen* (*Technical Univ. of Denmark*), *Ashish K. Bangaru*, *Xing-Yuan Miao*, *Xiao Chen*, *Rubén I. Erives*, *Malcolm McGugan*, *Nicolai F.-J. Johansen*
- 15:20 Coffee Break
- 15:40 On the Characterisation of Leading-Edge Erosion of Wind Turbines.  
*David H. Nash* (*Univ. of Strathclyde, UK*), *G. Leishman*, *K. Dyer*, *S. Jones*
- 16:10 Modelling bio-inspired metal-composite tubular joints with graded adherends.  
*Olufemi Taylor* (*Univ. of Aberdeen, UK*), *Mehmet Kartal*, *Maria Kashtalyan*
- 16:40 Close
- 18:30 Symposium Dinner

## Wednesday 3<sup>rd</sup> July – Morning Session

**Chair: Richard Neilson** (*National Decommissioning Centre, Univ. of Aberdeen*)

- 09:00 Development of underwater laser cutting for decommissioning using fibre lasers (Keynote)  
*Richard Neilson* (*Univ. of Aberdeen, UK*)
- 09:50 Non-smooth towing system for a shallow draft floating wind turbine  
*Marcin Kapitaniak* (*University of Aberdeen*), *Alicia Terrero-Gonzalez*, *Jim Papadopoulos*, *Richard D. Neilson*
- 10:20 Thermal dynamic behaviour of cryogenic cooling for low-energy impact fracturing of S3355J2 carbon steel grade structures  
*Kenneth Bisgaard Christensen* (*CERN, Switzerland*), *Alireza Maheri*
- 10:50 Coffee Break
- 11:15 Panel Discussion on ‘Future directions in scientific research and technology development in hydrogen storage and transport and wind energy infrastructure’  
  
*Panel Members:*  
*Emilio Martínez-Pañeda* (*Univ. of Oxford, UK*)  
*Tsuyohiko Fujigaya* (*Kyushu Univ., Japan*)  
*Mark Spearing* (*Univ. of Southampton, UK*)
- 12:15 Closing Remarks
- 12:30 Lunch

## Thursday 4th July

Visit to Balmoral Castle

Pick up from Broad Street, off Union Street (Aberdeen City Centre)