

**CARDIFF**  
UNIVERSITY

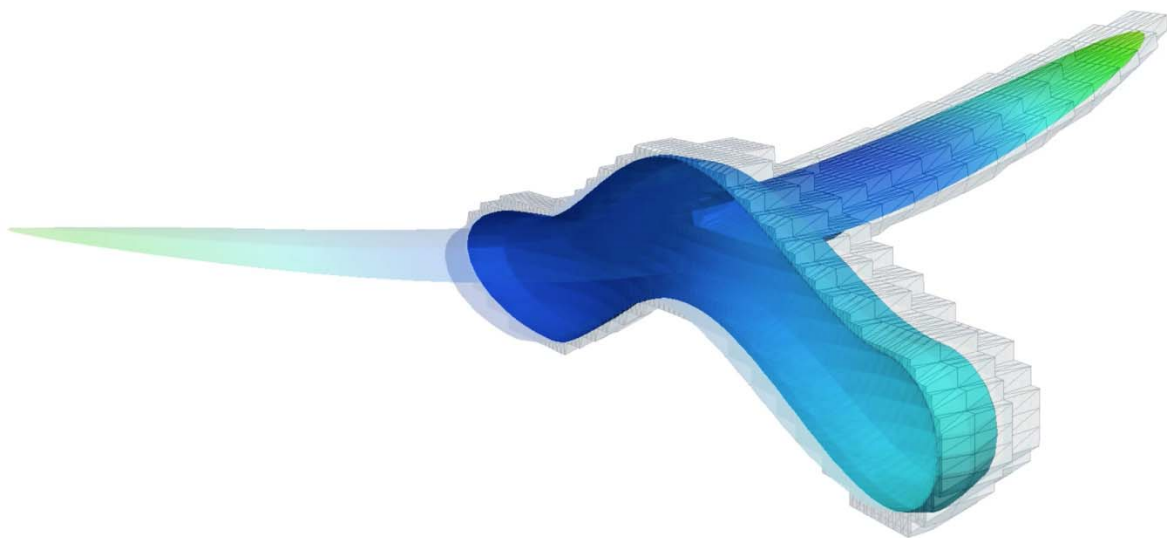
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**ACME-UK 2016**  
**24<sup>th</sup> Conference on Computational  
Mechanics**

31 Mar – 1 Apr 2016 Cardiff

**A C M E**

Association of Computational  
Mechanics in Engineering - UK



**CONFERENCE PROGRAMME**

# **CONTENTS**

- **ACME (UKACM) NEWS AND COMMITTEES**
- **CONFERENCE ORGANISERS**
- **PRESENTATION INSTRUCTIONS**
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## ACME NEWS

**ACME** is changing its name to **UKACM**

See the new UKACM Website (<http://ukacm.org/>)

## UKACM Executive committee

### Members

Charles Augarde	Durham University	President
Akbar Javadi	University of Exeter	Secretary
Omar Lagrouche	Herriot-Watt University	Treasurer
Rubén Sevilla	Swansea University	Webmaster

### Co-opted members

Harm Askes	The University of Sheffield
René de Borst	The University of Sheffield
Asaad Faramarzi	University of Birmingham
Antonio Gil	Swansea University
Tony Jefferson	Cardiff University
Roger Owen	Swansea University
Chris Pearce	University of Glasgow

### Past President

Carlo Sansour	Nottingham University
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## HISTORY

The Association was formed in March 1992 to both promote research in computational mechanics within the UK, and to establish formal links with similar organisations in Europe and the rest of the world.

The principal activity of the Association involves the organisation of an annual two day conference on computational mechanics, developments and research trends. The purpose of this conference is to provide a forum for reviewing activities in all areas of computational mechanics. This includes solid and structural mechanics, fluid mechanics, computational fluid dynamics, gas, bioengineering, geomechanics, electromagnetics, multi-physics and mesh generation. There is a particular emphasis on interdisciplinary aspects to enable cross-fertilisation to take place between different disciplines.

## CONFERENCE CHAIRS

Tony Jefferson ([JeffersonAD@Cardiff.ac.uk](mailto:JeffersonAD@Cardiff.ac.uk))

Pierre Kerfriden ([KerfridenP@cardiff.ac.uk](mailto:KerfridenP@cardiff.ac.uk))

## ORGANISING COMMITTEE

Susanne Claus

Tony Jefferson

Pierre Kerfriden

Iulia Mihai

## SCIENTIFIC COMMITTEE

Peter Cleall

Abhishek Kundu

Susanne Claus

Tony Jefferson

David Kennedy

Iulia Mihai

Pierre Kerfriden

Steve Rees

## CARDIFF UNIVERSITY CONFERENCE OFFICE TEAM

Samantha Emmott – Conference Manager ([ACME2016@cardiff.ac.uk](mailto:ACME2016@cardiff.ac.uk))

Teresa Waldron – Conference Officer

## PRESENTATION INSTRUCTIONS

Please go to your assigned lecture room during the break before your talk in order to upload your presentation onto the lecture room workstation, or to check that your laptop works with the AV system in the room.

Presentations are at 20 minute intervals in all parallel sessions. We suggest that your actual presentation is no more than 16 minutes long, which will allow time for questions and change over.

## Wi-Fi

Our wireless network is an eduroam service so students, researchers and staff from participating institutions can connect to our wireless network with a username and password from their home institution.

As you are a conference delegate you will also be able to connect to the visitor wireless service: CU-Visitor Wi-Fi, which will appear on your list of available networks.

If you have trouble accessing the wireless service during the conference please see the staff at the registration desk who will be able to provide you with a guest account.

## PLENARY SPEAKERS



### **Professor Antonio Huerta**

Laboratori de Càlcul Numèric  
Universitat Politècnica de Catalunya, Barcelona

#### **Research Interests**

- Computational methods
- Finite elements
- Discontinuous Galerkin
- Nonlinear computational mechanics
- Fluid flows, boundary motion, convection-diffusion
- Error estimation and adaptivity
- Reduced order models



### **Professor Anthony Gravouil**

Multiscale Mechanics for Solids (MIMESIS)  
Transversal Activity : Calcul Numérique  
Université de Lyon. INSA

#### **Research interests**

- Numerical computation
- Software development
- Dynamics
- Damage & Fracture



### **Prof. Dr. Ir. L.J. Sluys**

Delft University of Technology

#### **Research Interests**

- Computational mechanics of materials
- Localisation
- Multiscale methods
- Impact analysis



### **Dr Garth Wells**

University of Cambridge, UK

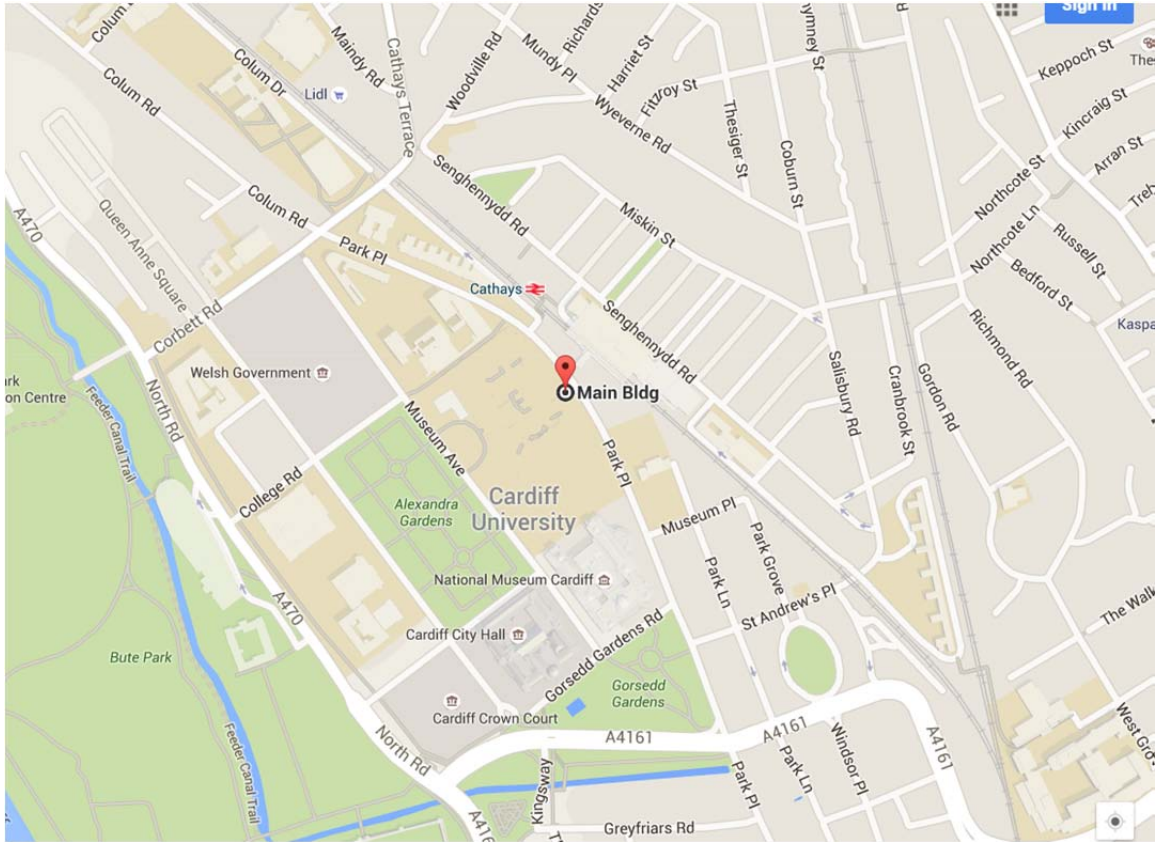
#### **Research interests**

- Computational physics
- Atomistic simulation of materials
- Molecular dynamics
- First principles simulation
- Multiscale modelling
- Configurational sampling
- Electronic structure calculations



## CONFERENCE VENUE

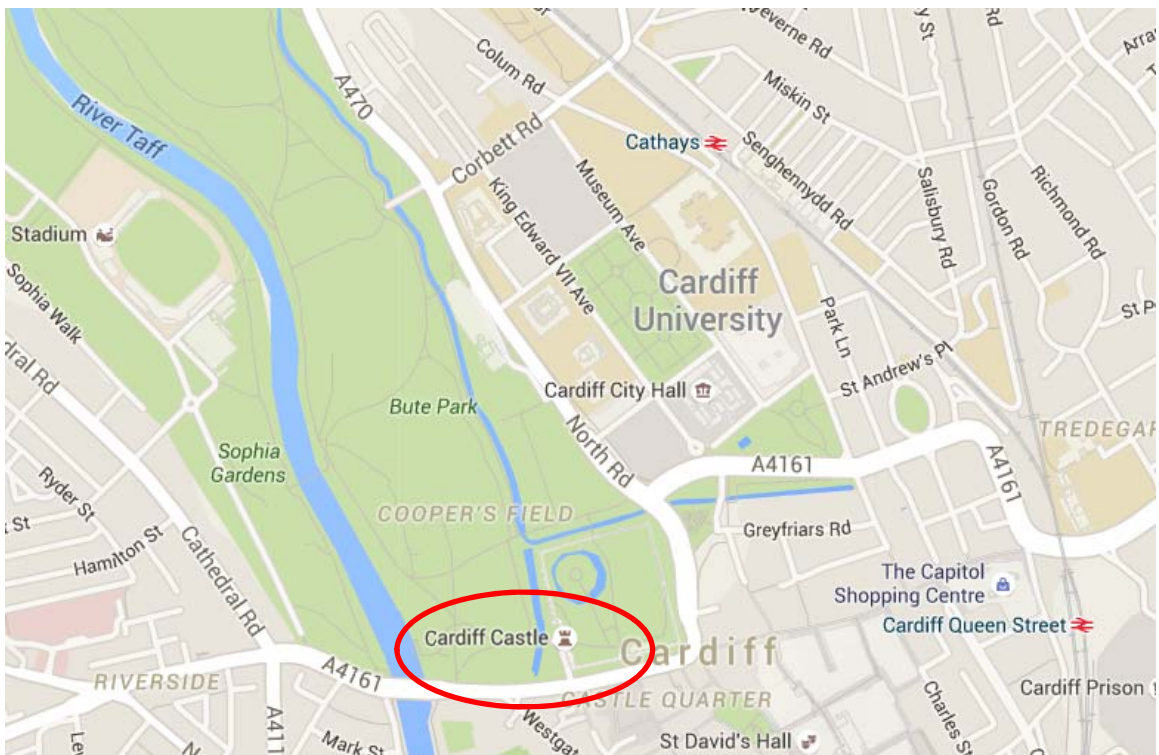
Cardiff University Main Building, Park Place, Cardiff, CF10 3AT



## BANQUET VENUE

Cardiff Castle Interpretation Centre

Castle Street, Cardiff, CF10 3RB



## ACME 2016. 30 March - 1 April 2016

ACME SCHOOL. WEDNESDAY 30 March.	
13:00-14:00	Registration School/Conference. Viriamu Jones Gallery, Main Building
14:00-15:15	Session 1. Room 1
15:15-15:45	Coffee Break
15:45-17:00	Session 2. Room 1
17:00-19:00	Conference Registration* <span style="float: right; border: 1px solid black; padding: 2px;">17.20-18.45. ACME Board meeting. Room 5</span>

Conference Day 1. THURSDAY 31 March.											
08:00-09:00	Late Registration*										
09:00-09:15	Opening Ceremony. Room 1										
09.15-10.00	Plenary session 1: A Huerta. Room 1. Chair: P Kerfriden										
10:00-10:30	Coffee Break										
10:30-12:30	Parallel sessions. PS1										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Room 1</td> <td>Room 2</td> <td>Room 3</td> <td>Room 4</td> <td>Room 5</td> </tr> <tr> <td>PS1.1</td> <td>PS1.2</td> <td>PS1.3</td> <td>PS1.4</td> <td>PS1.5</td> </tr> </table>	Room 1	Room 2	Room 3	Room 4	Room 5	PS1.1	PS1.2	PS1.3	PS1.4	PS1.5
Room 1	Room 2	Room 3	Room 4	Room 5							
PS1.1	PS1.2	PS1.3	PS1.4	PS1.5							
12:30-13:30	Lunch <span style="float: right; border: 1px solid black; padding: 2px;">ACME Executive committee meeting. Room 0.52</span>										
13:30-14:15	Plenary session 2: A Gravouil. Room 1. Chair: C Pearce										
14:20-15:40	Parallel sessions. PS2										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Room 1</td> <td>Room 2</td> <td>Room 3</td> <td>Room 4</td> <td>Room 5</td> </tr> <tr> <td>PS2.1</td> <td>PS2.2</td> <td>PS2.3</td> <td>PS2.4</td> <td>PS2.5</td> </tr> </table>	Room 1	Room 2	Room 3	Room 4	Room 5	PS2.1	PS2.2	PS2.3	PS2.4	PS2.5
Room 1	Room 2	Room 3	Room 4	Room 5							
PS2.1	PS2.2	PS2.3	PS2.4	PS2.5							
15:40-16:10	Coffee Break										
16:10-17:50	Parallel sessions. PS3										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Room 1</td> <td>Room 2</td> <td>Room 3</td> <td>Room 4</td> <td>Room 5</td> </tr> <tr> <td>PS3.1</td> <td>PS3.2</td> <td>PS3.3</td> <td>PS3.4</td> <td>PS3.5</td> </tr> </table>	Room 1	Room 2	Room 3	Room 4	Room 5	PS3.1	PS3.2	PS3.3	PS3.4	PS3.5
Room 1	Room 2	Room 3	Room 4	Room 5							
PS3.1	PS3.2	PS3.3	PS3.4	PS3.5							
19:30-23:00	Conference Dinner										

Conference Day 2. FRIDAY 1 April.											
09:00-09:45	Plenary session 3: L Sluys. Room 1. Chair: H Askes										
09:45-10:30	Plenary session 4: G Wells. Room 1. Chair: C Augarde										
10:30-11:00	Coffee Break										
11:00-12:40	Parallel sessions. PS4										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Room 1</td> <td>Room 2</td> <td>Room 3</td> <td>Room 4</td> <td>Room 5</td> </tr> <tr> <td>PS4.1</td> <td>PS4.2</td> <td>PS4.3</td> <td>PS4.4</td> <td>-</td> </tr> </table>	Room 1	Room 2	Room 3	Room 4	Room 5	PS4.1	PS4.2	PS4.3	PS4.4	-
Room 1	Room 2	Room 3	Room 4	Room 5							
PS4.1	PS4.2	PS4.3	PS4.4	-							
12:40-13:30	Lunch										
13:30-15:10	Parallel sessions. PS5										
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Room 1</td> <td>Room 2</td> <td>Room 3</td> <td>Room 4</td> <td>Room 5</td> </tr> <tr> <td>PS5.1</td> <td>PS5.2</td> <td>PS5.3</td> <td>PS5.4</td> <td>-</td> </tr> </table>	Room 1	Room 2	Room 3	Room 4	Room 5	PS5.1	PS5.2	PS5.3	PS5.4	-
Room 1	Room 2	Room 3	Room 4	Room 5							
PS5.1	PS5.2	PS5.3	PS5.4	-							
15:10-15:30	Coffee Break										
15:30-16:00	Room 1 Announcement of UKACM (formerly ACME) 2017 at Birmingham University: A Faramarzi. Conference close										

### All rooms in Cardiff University Main Building, Park Place, Cardiff, CF10 3XQ

Room 1. Large Shandon	Room 2. Wallace Lecture Theatre
Room 3. Large Chemistry	Room 4. Small Chemistry
Room 5. Council Chamber	

\* Payment must be made prior to the conference

**PARALLEL SESSIONS 1. (PS1)**

**Thursday 10:30-12:30**

<b>Room 1</b>		
<b>PS1.1. Optimisation and Inverse problems. Chair: M Gei</b>		
10:30-10:50	Akbar Javadi, Mohammed Hussain,	A comparative simulation-optimization study on effective management of saltwater intrusion in coastal aquifers
10:50-11:10	Thomas Adams, Stefano Giani, William Coombs	Topology optimisation using level set methods and the discontinuous Galerkin method
11:10-11:30	Jack Hale, Patrick Farrell, Stéphane Bordas	Bayesian statistical inference on the parameters of a hyperelastic body
11:30-11:50	Abhishek Kundu, Pierre Kerfriden	Robust probabilistic optimization of engineering systems under uncertainty
11:50-12:10*	David Naumann, Ben Evans, Oubay Hassan	A novel implementation of Aerodynamic Shape Optimisation applied to a race car diffuser and a jet intake duct
<b>Room 2</b>		
<b>PS1.2. Waves and electromagnetics. Chair: O Laghrouche</b>		
10:30-10:50	Scott Bagwell, Ledger Paul, Antonio Gil	hp Finite Elements for the Simulation of Coupled Acoustic-Magneto-Mechanical Systems with Application to MRI Coil Design
10:50-11:10	Konstantinos Christodoulou, Omar Laghrouche, Shadi Mohamed, Jon Trevelyan	Solving short wave problems using high order finite elements
11:10-11:30	Mark Dawson, Ruben Sevilla, Kenneth Morgan, Oubay Hassan	High fidelity computation of electromagnetic resonant modes in cavities
11:30-11:50	Mayank Drolia, Shadi Mohamed, Omar Laghrouche, Mohammed Seaid, Jon Trevelyan	Novel Finite Elements for initial value problems of light waves in the time domain
11:50-12:10	Shengze Li, Jon Trevelyan, Weihua Zhang	A Model Reduction Method for Boundary Element Method
12:10-12:30	Zhaowei Liu, Robert Simpson, Fehmi Cirak	An Isogeometric Boundary Element Method with Subdivision Surfaces for Helmholtz analysis
<b>Room 3</b>		
<b>PS1.3. Fluid mechanics and F/S interaction I. Chair: T Weinzierl</b>		
10:30-10:50	Mohammed Abo Dhaheer, Bhushan Karihaloo,	Simulation of self-compacting concrete flow in J-ring using smoothed particle
10:50-11:10	Mohammed Al-Mosallam, Kensuke Yokoi	Efficient implementation of volume/surface average based multi-moment method
11:10-11:30	Muna Al-Rubaye, Bhushan Karihaloo, Sivakumar Kulasegaram	Simulation of the flow of self-compacting concrete in the L-box using smooth particle hydrodynamics (SPH) method
11:30-11:50	Wajde Alyhya, Bhushan Karihaloo, Siva Kulasegaram	Simulation of self-compacting concrete in V-funnel test by SPH
11:50-12:10	Sam Hewitt, Alistair Revell, Lee Margetts	A Novel Black-Box Massively Parallel Partitioned Approach to Fluid-Structure Interaction Problems
<b>Room 4</b>		
<b>PS1.4. Advanced Applications I. Chair: T Jefferson</b>		
10:30-10:50	Sakdirat Kaewunruen, Olivia Mirza, Dan Thomson	Responses and vulnerability of composite railway track slab to train derailments
10:50-11:10	Peyman Afzal, Mohammadreza Nikzad, Andrew Wetherelt, Amir Bijan Yasrebi, Akbar Javadi	Determination of relationship between Uniaxial Compressive Strength (UCS) and rock densities using fractal modelling in Karoun-4 Dam, SW Iran
11:10-11:30	Ahmad Al-Azzawi, Luiz Kawashita, Carol Featherston	Delamination characteristics of Glare laminates containing Doubler and Splice features under high cycle fatigue loading
11:30-11:50	Safaa Al-Jumaili, Matthew Pearson, Karen Holford, Mark Eaton, Rhys Pullin	Fast and Reliable Acoustic Emission Source Location Technique in Complex Structures
11:50-12:10	Ali Al-Khafaji, Roger Grosvenor	Experimental Model-Based Simulation for Health Monitoring of a Non-Linear Liquid Level System
12:10-12:30*	Removed	
<b>Room 5</b>		
<b>PS1.5. Biomechanics I. Chair: P Kerfriden</b>		
10:30-10:50	Hayder Hasan, Perumal Nithiarasu	An iterative Locally Conservative Galerkin (LCG) method for studying flow in a human arterial network
10:50-11:10	Vasileios Vavourakis, Peter Wijeratne, Rebecca Shipley, Triantafyllos Stylianopoulos, David Hawkes	The Mechanical Underpinning of Tumour-induced Angiogenesis and Growth
11:10-11:30	Mohammed Al-Saad, Sivakumar Kulasegaram, Stephane Bordas	Blood flow simulation using smoothed particle hydrodynamics
11:30-11:50	Kevin Bronik, Sam Evans, Pierre Kerfriden	Mechanical description and engineering analysis of cutting and needle insertion into Human skin
11:50-12:10	Jason Carson, Raoul Van Loon, Dareyoush Rassi, Michael Lewis	Development of a Cardiovascular Network Model During Pregnancy

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\*=Time or session change



**PARALLEL SESSIONS 2 (PS2)**

**Thursday 14:20-15:40**

<b>Room 1</b>		
<b>PS2.1. Solids and Structures I. Chair: W Coombs</b>		
14:20-14:40	Charlton Tim, Will Coombs, Charles Augarde	Gradient elasticity with the material point method
14:40-15:00	Cortis Michael, Charles Augarde, William Coombs	Implicit essential boundaries in the Material Point Method
15:00-15:20	Muthana Al-Saymaree, David Kennedy, Carol Featherston	Effect of shear load direction in the critical buckling of composite plate under combined in plane loading
15:20-15:40	Pedro Bonilla, Pierre Kerfriden	Comparison and improvement of implicit residual error estimates based on reduction to local Dirichlet Patch Problems through an unified framework
<b>Room 2</b>		
<b>PS2.2. Failure and Damage I. Chair: P Grassl</b>		
14:20-14:40	Weilong Ai, Charles Augarde, Jon Trevelyan	Branched crack modelling with the Cracking Particle Method
14:40-15:00	Bakr Al-Azzawi, Bhushan Karihaloo	Fracture and fatigue of a self-compacting version of CARDIFRC mix II
15:00-15:20	Waled Alnaas, Anthony Jefferson	Acceleration techniques for the nonlinear finite element analysis of quasi-brittle materials
15:20-15:40	Robert Bird, William Coombs, Stefano Giani	Two dimensional configurational-force-driven crack propagation using the discontinuous Galerkin method with rp-adaptation
<b>Room 3</b>		
<b>PS2.3. Geomechanics I. Chair: A Javadi</b>		
14:20-14:40	Alireza Ahangar Asr, Akbar Javadi	An evolutionary approach to modelling effects of chemicals on soils
14:40-15:00	Thomas Bower, Anthony Jefferson, Peter Cleall	A micro-mechanics based soil-fibre composite model for use with finite element analysis
15:00-15:20	Asaad Faramarzi, Koohyar Faizi, Samir Dirar, Moura Mehravar, Ouahid Harireche	Modelling the seepage flow during caisson installation in a natural seabed
15:20-15:40	Lee Hosking, Hywel Thomas	An Investigation of Different Borehole Layouts for Carbon Sequestration in Coalbeds
<b>Room 4</b>		
<b>PS2.4. Material Modelling I. Chair: A McBride</b>		
14:20-14:40	Harm Askes, Dario De Domenico	A multi-scale gradient elasticity model with dispersion correction
14:40-15:00	Robert Davies, Anthony Jefferson	Micromechanical solution for simulating autogenous healing in cementitious materials
15:00-15:20	Daniel de Bortoli, Fauzan Adziman, Eduardo de Souza Neto	Multi-scale modelling of stress-induced martensitic phase transformations
15:20-15:40	Jonathan Gordon, Eudardo de Souza Neto, Matthew Thomas	A 3D Single Crystal Hyper elastic-viscoplastic material model, applied to metallic HCP granular structures
<b>Room 5</b>		
<b>PS2.5. Biomechanics II. Chair: V Vavourakis</b>		
14:20-14:40	Pradeep Keshavanarayana, René De Borst, Martin Ruess	A monolithic approach to cell contractility
14:40-15:00	Ghaidaa Khalid, Michael Jones, Allan Jones, Shwe Soe, Peter Theobald	Preliminary Numerical Simulations to Investigate the kinematics of Infant Head Impact.
15:00-15:20	Kulchamai Thienkarochanakul, Daniel Hiscocks, Akbar Javadi	A New Typical Knee Brace for Knee OA Patients
15:20-15:40	Hayley Wyatt, Khulud Alayyash, Sam Evans, Angela Mihai	Computer modelling of cellular structures under uniaxial loading

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**PARALLEL SESSIONS 3 (PS3)**

**Thursday 16:10-17:50**

<b>Room 1</b>		
<b>PS3.1. Solids and Structures II. Chair: A Gil</b>		
16:10-16:30	Lukasz Kaczmarczyk, Zahur Ullah, Pearce Chris	Prism solid-shell with heterogenous and hierarchical approximation basis
16:30-16:50	Osama Ibrahim, Antonio J. Gil, Chun Hean Lee, Javier Bonet	A first order hyperbolic framework for large strain computational solid dynamics: A vertex-centred Updated Lagrangian scheme
16:50-17:10	Muhammad Iqbal, Heiko Gimperlein, Shadi Mohamed, Omar Laghrouche	Solution of three dimensional transient heat diffusion problems using enriched finite element method
17:10-17:30	Giorgio Greto, Sivakumar Kulasegaram, Chun Hean Lee, Antonio Gil, Javier Bonet	A first order mixed formulation for fast solid dynamics using Smooth Particle Hydrodynamics
17:30-17:50	Xiaoyang Liu, Heena Patel, Carol Featherston, David Kennedy	Two level layup optimization of composite plate using lamination parameters
<b>Room 2</b>		
<b>PS3.2. Failure and Damage II. Chair: R Davies</b>		
16:10-16:30	Peter Grassl	Fracture processes in quasi-brittle materials: Linking heterogeneity to crack roughness
16:30-16:50	Jian Deng, Guangming Zhou, Pierre Kerfriden, Stéphane Bordas, Qiaozhi Yin	Progressive Damage Analysis On Yielding Of Bonded Patch Repaired Composite Laminates Under Compressive Loading
16:50-17:10	Meor Iqram Meor Ahmad	Modelling of Damage Behaviour using The Rousselier Model in 7075 Aluminium Alloy
17:10-17:30	Gabriel Hattori, Samuel Kettle, Lucas Campos, Jon Trevelyan, Eder Albuquerque	An adaptive cross approximation (ACA) for the extended boundary element method (XBEM) in anisotropic materials
17:30-17:50	Davood Mahdavian, Akbar Javadi	Numerical investigation of hydraulic fracturing
<b>Room 3</b>		
<b>PS3.3. Geomechanics II. Chair: A Faramarzi</b>		
16:10-16:30	Konstantinos Krestenitis, Tobias Weinzierl, Tomasz Koziara	A Multiscale DEM Contact Detection Code using Triangles for Non-Spherical Particles
16:30-16:50	Rector Mukwiri, Yousef Ghaffari Motlagh, Will Coombs, Charles Augarde	Energy dissipation in granular material under 1D compression
16:50-17:10	Jose Javier Munoz-Criollo, Peter Cleall, Stephen Rees	Impact of soil surface heat fluxes and weather conditions on the performance of near surface interseasonal ground energy collection and storage systems
17:10-17:30	Matthew Potticary, Antonis Zervos, John Harkness	The Effect of Particle Shape on the Strength of Granular Materials
<b>Room 4</b>		
<b>PS3.4. Material Modelling II. Chair: I Mihai</b>		
16:10-16:30	Andrew McBride, Daniel Gottschalk, Daya Reddy, Ali Javili, Peter Wriggers	Computational and theoretical aspects of a grain-boundary model that accounts for grain misorientation and grain-boundary orientation
16:30-16:50	Euan Richardson, Pearce Chris, Lukasz Kaczmarczyk	Modelling the Mechanics of Timber Cell Walls
16:50-17:10	M. Amir Siddiq, Umair Asim	A Crystal Plasticity Finite Element Method based study to investigate the effect of microvoids in single crystalline aluminium alloy
17:10-17:30	Zahur Ullah, Kaczmarczyk Lukasz, Pearce Chris	Nonlinear micro-mechanical response of the fibre-reinforced polymer composites including matrix damage and fibre-matrix decohesion
17:30-17:50	Tingting Zhao, Jun Kato, Y T Feng	Random Normal Contact Laws for Particles with Rough Surface in Discrete Element Modelling
<b>Room 5</b>		
<b>PS3.5. Coupled Problems. Chair: C Heaney</b>		
16:10-16:30	Jack Barnard	Simulating mixing limited reactions in porous media using finite differences
16:30-16:50	Simona Di Fraia, Perumal Nithiarasu, Nicola Massarotti	Finite element modelling of electro-osmotic flow in porous media
16:50-17:10	Hichem Boulechfar, Mahfoud Djeddar	Numerical Study of Convective Heat and Mass Transfer through a Saturated Porous Medium in Horizontal Cylindrical Annulus
17:10-17:30*	Chuansan Ma, Tony Jefferson	A numerical model for simulating liquid flow in and around discrete concrete cracks

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**PARALLEL SESSIONS (PS4)**

**Friday 11:00-12:40**

<b>Room 1</b>	<b>PS4.1. Solids and Structures III. Chair: R Sevilla</b>	
11:00-11:20*	Ali Nassr, Akbar Javadi, Asaad Faramarzi	Self-learning finite element method and engineering applications
11:20-11:40	Euan Muir, Chris Pearce, Lukasz Kaczmarczyk	Evaluation of the Tangent Stiffness Matrix for Hyperelastic Fibres using Automatic Differentiation
11:40-12:00	Hoang Nguyen, Thuc Vo, Hung Nguyen-Xuan	Bending and Buckling Analysis of Functionally Graded Microplates using Isogeometric Approach
12:00-12:20	Daniel Paladim, Jose Paulo Moitinho de Almeida, Stephane Bordas, Pierre Kerfriden	Guaranteed error bounds for the homogenisation of random materials
12:20-12:40	Rahmati MT, H. Bahai, Giulio Alfano	On the Small Scale Nonlinear Finite Element Analysis of Flexible Risers
<b>Room 2</b>	<b>PS4.2. Failure and Damage III. Chair: G Alfano</b>	
11:00-11:20	Chris Pearce, Lukasz Kaczmarczyk	Smooth static and dynamic crack propagation
11:20-11:40	Joaquin Navarro-Zafra, Jose Luis Curiel-Sosa, María del Carmen Serna Moreno, Christophe Pinna, Juan Luis Martínez Vicente, Nurrasidah Rohaizat, Behrooz Tafazzolimoghaddam	An approach for dynamic analysis of stationary cracks using XFEM
11:40-12:00	Anil Prathuru, Nadimul Faisal, Sha Jihan, John Steel	Indentation Method to Evaluate Metal-to-Metal Adhesive Bond Residual Strength
12:00-12:20	Marco Albarella, Roberto Serpieri, Giulio Alfano, Elio Sacco	A multiscale cohesive-zone model accounting for interlocking and separation of damage and frictional dissipation
<b>Room 3</b>	<b>PS.4.3. Geomechanics III. Chair: L Hosking</b>	
11:00-11:20	Richard Sandford, Hywel Thomas	Modelling fluid flows through multiple discrete fractures using finite elements for ground energy problems
11:20-11:40	Manhui Wang, Lee Hosking, Hywel Thomas	Development of a High Performance Computing Approach for Studying the Coupled Behaviour of Porous Media
11:40-12:00	Renato Zagorščak, Hywel Thomas	Thermo-osmosis in saturated shale
12:00-12:20 *		
<b>Room 4</b>	<b>PS4.4. Advanced Applications II. Chair: P Gosling</b>	
11:00-11:20	Heaney Claire, Andrew Buchan, Christopher Pain, Simon Jewer	A POD reduced order model for criticality problems in reactor physics, varying control rod settings and temperature
11:20-11:40	Musa Aliyu, Chen Huapeng, Ouahid Harireche	Finite element modelling for productivity of geothermal reservoirs via extraction well
11:40-12:00	Mohammed Hussain, Akbar Javadi, Mohsen Sherif	Artificial recharge of coastal aquifers using treated wastewater to control saltwater intrusion
12:00-12:20	Amir Jalalian-Khakshour	Evaluation of wind power output intermittency through a simulation method
12:20-12:40	Majid Kadhim, Zhangjian Wu, Lee Cunningham	FE modelling of CFRP strengthened steel members under impact loads

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 Room 3. Large Chemistry                Room 4. Small Chemistry  
 Room 5. Council Chamber

\*Time or session change

**PARALLEL SESSIONS (PS5)**

**Friday 13:30-15:10**

<b>Room 1</b>	<b>PS5.1. Solids and Structures IV. Chair: A Kundu</b>	
13:30-13:50	David Stark, Heiko Gimperlein	A partition of unity boundary element method for transient wave propagation
13:50-14:10	Yousef Ghaffari Motlagh, William Coombs	A high-order material point method
14:10-14:30	Peng Yu, Susanne Claus, Stéphane Bordas, Pierre Kerfriden	Error estimation and space-time adaptivity for the isogeometric analysis of transient structural dynamics
14:30-14:50	Basem Suliman, Carol Featherston, David Kennedy	Vibration behaviour of delaminated composite plates using exact stiffness and finite element analysis
<b>Room 2</b>	<b>PS5.2. Failure and Damage IV. Chair: MA Siddiq</b>	
13:30-13:50	Xiaoyi Zhou, Peter Gosling, Zahur Ullah, Chris Pearce, Lukasz Kaczmarczyk	Multi-Scale Finite Element Based Time-Dependent Reliability Analysis for Laminated Fibre Reinforced Composites
13:50-14:10	Xuan Peng, Elena Atroshchenko, Pierre Kerfriden, Stephane Bordas	3D fatigue fracture modeling by isogeometric boundary element methods
14:10-14:30	Athanasios Tsamos, Lee Margetts, Andrey Jivkov	Implementation of a Cohesive Zone Model as a Cohesive Interface Element Subroutine into the open source FE package ParaFEM
14:30-14:50	Danas Sutula, Stephane Bordas, Pierre Kerfriden	Energy minimizing multi-crack growth in linear elastic fracture using the extended finite element method
<b>Room 3</b>	<b>PS.5.3. Fluid mechanics and F/S interaction II. Chair: R Ahmadian</b>	
13:30-13:50	Thomas Xuan Meng, Julien Reboud, Lukasz Kaczmarczyk	Acoustic Waves and electromagnetics in Microfluidic Application with Hierarchical Finite Element
13:50-14:10	Atheel Jameel, Kensuke Yokoi, Phil Bowen	Two Droplets interaction on substrate
14:10-14:30	Bun Lo, Oubay Hassan, Jason Jones	Parallel implementation of numerical modelling of concentration polarisation and cake formation in membrane filtration processes
14:30-14:50	Syazana Omar, Kensuke Yokoi	A 3rd order ENO-like multi-moment method for solving hyperbolic conservation laws
14:50-15:10	Seyed Hossein Madani, Jan wissink, Hamid Bahai	Modeling inertial forces on cylinders in cross flow using moving frame of reference
<b>Room 4</b>	<b>PS5.4. Advanced Applications III. Chair: S Claus</b>	
13:30-13:50	Reza Naseri-Karim-Vand, Akbar A Javadi, Mohammed S Hussain	Fracture models for hydraulic fracturing stimulation: Comparison between Numerical method and an EPR-based method
13:50-14:10	Moura Mehravar, Paul Fleming, David Cole, Steph Forrester	Mechanical characterisation and strain rate sensitivity of rubber shockpad in 3G artificial turf
14:10-14:30	Jou-Yi Shih, David Thompson, Antonis Zervos	Modelling scheme for railway vehicle/track/ground dynamic interaction in the time domain
14:30-14:50	Mohammadreza Nikzad, Andrew Wetherelt, Amir Bijan Yasrebi, Akbar Javadi, Peyman Afzal	Rock Mass Quality Determination in Blasting at Jalal-Abad Iron Mine
14:50-15:10	Ce Liang, Chang Wang, Van Nguyen, Diane Mynors	Explicit Dynamics Finite Element Analysis of Energy Absorption Characteristics of Thin-Walled UltraSTEEL Columns

**All rooms are in Cardiff University Main Building, Park Place, Cardiff, CF10 3XQ**

Room 1. Large Shandon                      Room 2. Wallace Lecture Theatre  
 Room 3. Large Chemistry                Room 4. Small Chemistry  
 Room 5. Council Chamber







