

NAFEMS20 UK CONFERENCE



09:30 **OPENING OF CONFERENCE**

MONDAY 9TH NOVEMBER 2020 | DAY 1 - MORNING SESSION

PLENARY SESSION

Saving the Russian Mir Space Station : The Role of Computerised Simulation

KEYNOTE PRESENTER: Michael Foale CBE, British-American Astrophysicist & Former NASA Astronaut

Introduction to Open Spaces

John Verdicchio

11:00 REFRESHMENT BREAK

1A - OPTIMISATION

Using Optimisation in the Design of the RWUAS Air Vehicle Structure

INVITED PRESENTER:

Gordon Mackenzie, Leonardo Helicopters

Rapid Stochastic Broadband Acoustics on GPUs

Mark Allan, Zenotech Ltd

Automated Shape Optimization Technology Coupled with Upfront CFD

Sean Horgan, 80/20 Engineering Ltd

1B - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Torsional Stiffness Simulation of Metallic Disc Membrane Couplings Considering Pre-Stretch and Post-Buckling Behaviour

Murat Islam, John Crane UK Ltd.

The Development of Machine Learning Tools to Automate and Improve on the Identification of Invasive Non-native Species and Help Keep Boots off Ballast

Sam Ahdab, Mott MacDonald

A New Method for Fast Finite Element Explicit Crash Simulations

Alex Van Der Velden, Dassault Systemes Inc

1C - COMPUTATIONAL TRIBOLOGY 1

Recent Developments in Modelling Techniques to Study Surface Interactions in Tribology

INVITED PRESENTER:

Daniele Dini, Imperial College London

Optimization of Piston-Cylinder Liner Conjunction Micro-Geometry for Enhanced Tribo-Dynamic Performance

Stephen Bewsher, AVL List GmbH

Utilising Computational Tribology to Realise Multi-Scale Behaviour of Thin Solid Films

Robin Hildyard, Loughborough University

1D - INTRODUCTION TO THE ESSENTIALS OF SPDM

This short taster training course will include an introduction to SPDM based on 20 years of production experience for engineers currently not using an SPDM solution. It will cover SPDM project successes, the core technology of SDM and SPDM, the different classes of solutions available, how SPDM fits with other engineering systems and the value obtainable from SPDM, including functional Digital Twins.

Mark Norris, the SDMConsultancy

1E - DYNAMIC BENCHMARKS

SHARING GOOD PRACTICE IN EXPLICIT DYNAMICS

Computational Structural Mechanics Technical Working Group.

Workshop details coming soon.

12:35 LUNCH



DAY 1 - AFTERNOON SESSION

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13:35

PLENARY SESSION

The National Digital Twin
KEYNOTE SPEAKER: Mark Enzer, Mott MacDonald

14:45

REFRESHMENT BREAK

2A - COMPOSITES

European Materials Modelling Council
INVITED PRESENTER:
Gerhard Goldbeck, Goldbeck Consulting

Deep-learning Based Distortion Prediction in Composites Processing
Shuang Yan, University of Nottingham

Supporting Innovative Composite Technologies
Andrew Main, MSC software UK Ltd

Multiscale Modelling of Random and Hybrid Discontinuous Tow Based Composites
Rizwan Choudhry, University of Derby

2B - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Development of a Real-time Engine Temperature Monitoring System, Using AI Based on Accurate and Validated Thermal Simulation Data
Andrew MacLean, Maya HTT UK Ltd.

Increase CAE Productivity Levels Utilizing Machine Learning
Signe Stenseth, Open iT

Machine Learning for Satellite Mission Planning Using Weather Data
Christos Constantinou, The Centre for Modelling & Simulation (CFMS)

Artificially Intelligent Segmentation of a Shock Absorber X-ray CT Scan and Beyond
Emmanuela Baksiova, BETA CAE Systems UK Ltd

2C - SHEET METAL FORMABILITY – MATERIAL PROPERTIES, FAILURE AND SIMULATION

This workshop is intended to assist all those involved in the design of sheet metal components to identify the key material properties and potential failure modes during manufacture. The session will demonstrate how CAE methods can be used to simulate the manufacturing method in order to identify any potential problems with the process and establish if part design changes are required.

WORKSHOP TOPICS – PART 1:

- **Introduction to sheet metal forming processes**
- **Characterisation of sheet metal material properties for use in simulation**
- **Definition of process failureSimulations**

2D - OPEN DISCUSSION

VERIFICATION AND VALIDATION, SPECIFICALLY FOCUSING ON CODE VERIFICATION

- Recap – what is verification and validation (based around the NAFEMS/ASME V&V diagram)
- SGMWG/CFDWG
- Code verification (current practice, best practice)
- SGMWG/CFDWG
- Discussion

2E - UNCERTAINTY QUANTIFICATION 1

Stochastic Topology Optimization For Robust And Reusable Designs
Johannes Neumann, Rafinex SARL

Dealing with Uncertainty with Confidence
Edoardo Patelli, University of Strathclyde

Model Reduction and Uncertainty Quantification for Weld Simulations on Ferritic Materials
Jefri Draup, EDF Energy R&D

Uncertainty in Simulation and Test
Jack Reijmers, Nevesbu

16:50

SHORT BREAK

3A - ELECTROMAGNETICS

Motor Design Optimisation Including Electromagnetic Performance and Mechanical Stress
Tamara Monti, Dassault Systemes UK Ltd

3D Electromagnetic Eddy-Current Problems within the Finite Element Framework of Computing Platform FEniCS
Nunzio Palumbo, Rolls Royce plc

3B - INFRASTRUCTURE

Innovation Through Simulation in Built Environment
Ganga Kasi, Sir Robert McAlpine Ltd

Innovative Techniques for Bridge Assessment
Ricardo Teixeira , Mott MacDonald

3C - SHEET METAL FORMABILITY – MATERIAL PROPERTIES, FAILURE AND SIMULATION

WORKSHOP TOPICS – PART 2:

- **Discussion of the different materials used in sheet metal forming**
- **Description of how materials are tested to establish the required material parameters**
- **Application of simulation with an example using the Forming Limit Test**

3D - FROM GRAINS TO PROPERTIES

CALCULATING BULK SCALE BEHAVIOUR FROM MICROSTRUCTURES

Computational Structural Mechanics Working Group

Workshop details coming soon.

3E - UNCERTAINTY QUANTIFICATION 2

Effective Quadratures: Empowering Engineers with Open Source Computational Methodologies
Pranay Seshadri, The Alan Turing Institute

Validation of Numerical Modelling Tools for Slender Wing Design
Olivia Stodieck, Daptablade Ltd.

17:55

END OF DAY 1

DAY 2 - MORNING SESSION

TUESDAY 10TH NOVEMBER 2020 | DAY 2 - MORNING SESSION

08:30 PLENARY SESSION

Climate Change – How Can Climate Models Help us to Respond?

KEYNOTE SPEAKER: Vicky Pope, Met Office

Innovation through Engineering Simulation - A Rolls-Royce Perspective

INVITED PRESENTER: Akin Keskin, Rolls Royce

10:25 SHORT BREAK

4A - ADDITIVE MANUFACTURING

Rapid 3D Inspection of AM Components Using CT: From Defect Detection to Thermal Performance Simulation

Celia Butler, Synopsys

Structural Simulation of Components with Defects - A Workflow from Computed Tomography to Finite Element Simulation

Beate Lauterbach, Volume Graphics GmbH

4B - CFD 1

High-Fidelity CFD the Automotive and Motorsport Sectors

INVITED PRESENTER:

Neil Ashton, Amazon Web Services

Novel Multi-billion Degrees-of-freedom FEA Models for Rapid Simulation of the Thermo-mechanical Behaviour of a Complete Aero Engine

Neeraj Cherukunnath, Rolls Royce Plc

4C - COMPUTATIONAL TRIBOLOGY 2

Multi-body Based Multi-physics Approaches to Simulate Modern Powertrain Tribodynamic Challenges

INVITED PRESENTER:

Günter Offner, Loughborough University & AVL List GmbH

Tribodynamic Modelling of High-speed Rolling Element Bearings Using Experimentally Obtained Boundary Conditions

Harry Questa, Loughborough University

4D - OPEN SPACES

‘Open Spaces’ is a way to enable everyone attending the conference an opportunity to have their say and ask some poignant questions.

Delegates will create their own parallel working sessions around a central theme of strategic importance, such as:

- “How do I perform a successful non-linear analysis”
- “What is the future of linear elements in FEA analysis?”
- “Bad geometry, do I mesh it or stop?”
- “I want all my analysts to have PSE certification.”
- “Can I let non-specialists carry out advanced analysis / what measures should I put in place?”
- It is hoped that the result of ‘open spaces’ is a powerful, effective connecting and strengthening of what’s already happening in the engineering analysis community, planning and action, learning and doing.

4E - GETTING STARTED WITH ENGINEERING ANALYSIS

This exclusive free series of sessions will provide non-users of simulation with the information they need to take their next steps towards implementing an engineering analysis solution within their organisation. Through a series of training sessions, Q&A's, discussions and case studies, this event will provide a platform for simulation success.

11:25 REFRESHMENT BREAK

5A - MANUFACTURING PROCESS

Finite Element Simulation of the Braiding Process

Melodie Cueto Carrion, National Composites Centre

Understanding the Manufacturing Cost Drivers of Tolerances

Amanda Bligh, aPriori Technologies

Understanding Powder Behaviour in an Additive Manufacturing Process by Using DEM

Marina Sousani, DEM Solutions Ltd

Manufacturing Process Chain Model in Composites Manufacturing

Melodie Cueto Carrion, National Composites Centre

5B - CFD 2

Using Fluid Dynamics for Simulating Exterior Ballistics Phenomena

Véronique de Briey, Royal Military Academy

Employing Advanced CFD to Predict Oil Distribution, Churning Losses and Gearbox Cooling

David Percival, EnginSoft UK Limited

Numerical and Experimental Evaluation of Tile Stoves Mode of Operation

Markus Trenker, Flowdynamics

Increasing Product Reliability with Reduced Order Models

John Parry, Mentor Graphics Corp.

5C - WHAT ARE THE CHANCES OF THE SHIP SNAPPING? CONSIDERATIONS WHEN USING PROBABILISTIC ANALYSIS

In the April 2019 issue of NAFEMS BENCHMARK magazine, two challenge problems are presented.

The first one consists of two normal distributions, producing an analytical (theoretical) solution. The second one contains several distributions (normal, uniform and lognormal), and therefore an exact solution is not available.

At the NAFEMS World Congress 2019 these problems were discussed and a few solutions were presented. In this special session at the UK Conference, these solutions and additional ones will be deliberated in combination with the theoretical background and the pitfalls of these methods.

The NAFEMS Stochastics Technical Working Group

13:25 LUNCH

DAY 2 - AFTERNOON SESSION

14:15

6A - INNOVATIVE APPLICATIONS
Drag Coefficient Calculation of Cylindrical Structures Oscillating in Confined Fluid Environments Rezana Zarshat, Expro North Sea Ltd.
Rule-based Automatic Mesh Sizing for FEA and CFD Henry Bucklow, ITI
E-Motor Development At Porsche: Using An Optimization-Driven Multi-Physics Design Process Simon Guicheteau, Altair Engineering Ltd.
The Story Behind Building the World's Fastest Fully Electric Aircraft Sabrina Hafid, ANSYS UK Ltd

6B - CFD 3
Windtech Technology - Measuring Cold Exposure via Conjugate Heat Transfer Hassan Khawaja, UiT The Arctic University of Norway
Evaluation of Volume Cavity Replacement Technique on Industrial High-Fidelity CFD Models Nikolas Mitroglou, BETA CAE Systems UK Ltd.
Design and Optimization of Cooling System Component for Enhanced Airflow Joe Amodeo, Dassault Systemes UK Ltd
Process Optimisation in Robotic Arc Welding by Computational Fluid Dynamics Methods Alessio Basso, TWI Ltd

6C - SIMULATION GOVERNANCE
A value-focussed approach to the deployment of Simulation Data Management in Aerospace Mark Norris, The SDMConsultancy
Democratization of the Dough Baking Process James Dean, Double Precision Consultancy
How to succeed at SPDM Mark Norris, The SDMConsultancy
SDM Discussion?

6D - VMAP STANDARD (RELEASE 0.4.0) FOR SIMULATION PROCESS INTEROPERABILITY
<p>VMAP (vmap.eu.com), created via the almost-complete ITEA-VMAP project, has released a public version of the vendor-neutral standard for CAE data storage and transfer to enhance interoperability in virtual engineering workflows. This open and free-to-use standard defines data structures for geometry, discretization, material parameters, results and state variables and includes a software library to read/write the VMAP data files; test cases are also provided. The standard is supported by a strong community made up of industrial and software companies and vendors, experts from academia, etc.</p> <p>This workshop/discussion will present the VMAP release, current software implementations, test and use cases and the VMAP community. There will be ample time for Q&A and enable participants to discuss their simulation process requirements, their data transfer, etc. with the possibility of engaging in the creation of functioning simulation processes.</p>

6E - MULTIPHYSICS TECHNICAL WORKING GROUP PANEL DISCUSSION SESSION
Multiphysics Technical Working Group Workshop details coming soon.

15:55 REFRESHMENT BREAK

7A - DIGITAL TWINS
Digital Twin : Myth or Reality? INVITED PRESENTER: Prashant Khapane, Jaguar Land Rover
Survey Data Assimilation in Construction Sequence Simulation of a Large-scale Commercial Building Ian Watson, Robert Bird Group
Digital Twins in the Nuclear Industry: Implementation and Key Lessons Konstantin Vikhorev, Virtual Engineering Centre
Hardware and Software System for Managing the Life Cycle of Gas Turbines Egor Dobretsov, Satratek

7B - CFD 4
A Reduced Order Modelling for Flight Mechanics Simulation of a Tilt Wing EVTOL Concept Hovering in a Cross-Wind Condition Indi Tristante, Rolls-Royce
A Conceptual Study of an Externally Cooled, High Voltage Underground Cable Crossing Stephen King, Dassault Systemes UK Ltd
CFD Discussion Session

7C - INNOVATIVE APPLICATIONS
Simulation, Driving and Supporting Better Physical Experimentation INVITED PRESENTER: Rob Lewis, TotalSim Ltd.
Parallel Engineering Codes: Performance Optimisation with POP Methodology Fouzhan Hosseini, The Numerical Algorithms Group Ltd (NAG)
Industrial Digitalisation - Using Immersive Simulation to better Understand Data Ian Cant, Virtual Engineering Centre
An Aircraft System Level Simulation for Feasibility Study of Electrification on Strategic Air Transports Josepha Tristante, Welbeck DSFC

7D - SHORT TASTER COURSE: COMPLETE GUIDE TO AUTOMATIC DESIGN OPTIMISATION
<p>The short course will explain some practicalities of doing automatic design optimization as completely as possible. The course treats optimization generically, independent of sector, and will start by discussing design cycles, process simulation integration, design evaluations, design of experiments and move onto single and multi-disciplinary (MDO) and multi-objective optimizations (MOO). Time will limit the information provided and will not enable in depth discussion of more difficult concepts such as meta models, response surface, robust and statistical design. Examples from different sectors will be used to discuss and highlight the different issues, advantages and disadvantages of the tools available.</p> <p>Gino Duffett, NAFEMS</p>

17:55 END OF DAY 2

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