# NAFEMS Technical Working Group Overview

Computational Structural Mechanics (CSMWG)
2019

Computational Structural Mechanics

- The NAFEMS Computational Structural Mechanics Working Group (CSMWG) is concerned with the branch of engineering that uses numerical methods to calculate deformations, deflections, internal forces and stresses within structures.

- Meet face-to-face once every three months with dial-in facilities available. Meet online in the interim for more focussed discussions on specific topics.

- Collaborate with other groups where there are overlapping interests.

- **Chair:** Louise Wright, NPL
  Vice Chair: Adam Towse, Assystem

- The group includes representatives of Altair Engineering Ltd, ANSYS UK Ltd, Assystem UK Ltd, Atkins, AWE, Boeing, Cyient Ltd, Cummins Inc., Dassault Systemes UK Ltd, DIANA FEA, Dutton Simulation, ESI France, FETraining, GHD, Ingersoll Rand Club Car, MDAO Technologies, National Physical Laboratory, PDL Solutions (Europe) Ltd, Polytechnic Institute of Porto, Ramboll, Rolls-Royce, Rolls-Royce Submarines, Siemens PLM Software, Zentech International Ltd.

- Information about the Computational Structural Mechanics Working Group can be found on the NAFEMS website at
  www.nafems.org/community/working-groups/computational-structural-mechanics

- To enquire about joining this working group complete the online form at
  www.nafems.org/community/working-groups/computational-structural-mechanics/get_involved

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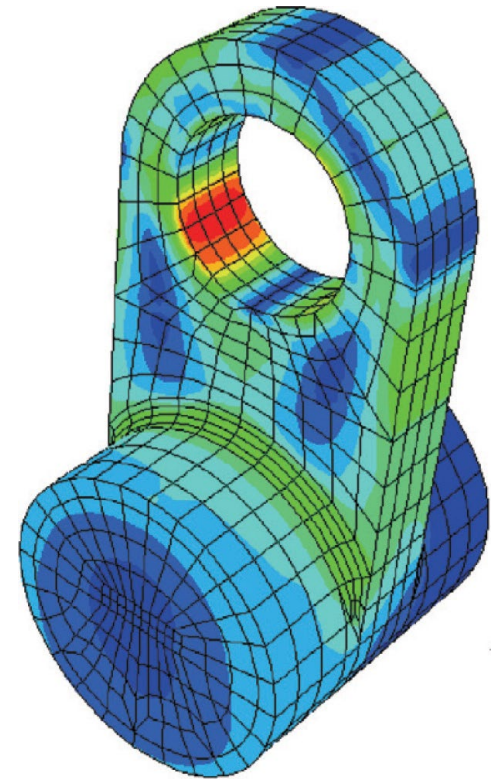
Computational Structural Mechanics

- **Topics of interest include:**
  - implicit and explicit dynamics; impact and large deformation problems; elastic-plastic, creep, fatigue, limit analysis, shakedown, ratcheting, fracture and damage; contact, joints and connections; and structural material models.
  - emerging modelling methods and new manufacturing and processing methods that affect structural response of materials and components
- **Current activities:**
  - Benchmark Special Edition on Structural Integrity, including:
    - Limit load and bolted joints
    - Bolt loosening
    - Crack propagation
    - Screwed joints
    - Evolution of codes
  - Publications at the review stage:
    - How to model bolted & riveted joints
    - How-to assess welded structures
    - How-to model the welding process

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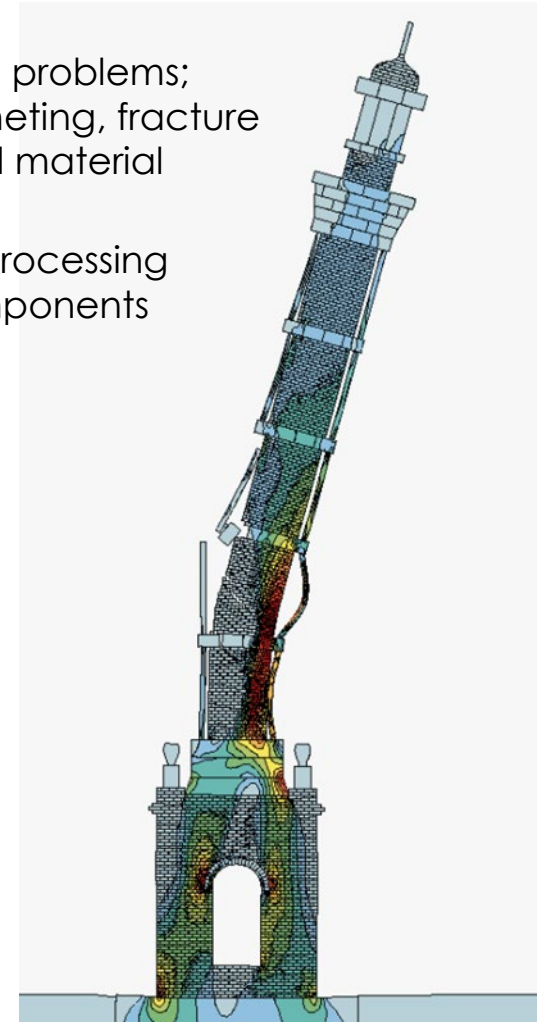
Computational Structural Mechanics

A Selection of Recent Outputs:

What are Particle and Meshless Methods? – Introductory Information
Why Do Manufacturing Simulation – Publication
Multiscale Modelling - Bridging Different Scales – Webinar

Future plans:

- **Two ITTs currently out:**
  - Considerations when modelling extreme deformation
  - Assessment of structures subject to blast loading
- **Assembling a set of explicit "Challenge problems" to highlight important aspects of modelling dynamic problems well**
  - Disseminate via Benchmark magazine
  - Publish problem definition one issue & solution & discussion the next.
- **Seeking to put together a multiscale modelling event**
  - Would like industry input rather than just academic research
  - May focus on composites as some techniques are more widely used than for metals & alloys

Chair Bio

Louise Wright is the Science Area Leader for Modelling at the National Physical Laboratory, the UK's national measurement institute.

Following an MA in Mathematics and an MSc in Mathematical Modelling and Numerical Analysis, she spent four years working with FE and CFD in industry before joining NPL in 1999.

Louise's work uses FE and similar methods to support experimental design, interpretation of measurement results, and solution of industrial problems. She is interested in improving confidence in use of FE results in decision-making processes and works on uncertainty evaluation applied to finite element models.

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