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ADVANCES IN COMPUTATIONAL CONSTITUTIVE MODELLING

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ABSTRACT

This thematic session focuses on recent developments in constitutive modelling supported by advanced computational techniques. Contributions are welcome on physics-based, multiscale, and data-driven approaches that enhance the understanding, formulation, and implementation of constitutive laws for different classes of materials (metallic, polymeric, ceramic, composite, and geomaterials), under complex loading conditions. The session aims to bring together researchers working on the integration of theory, experiments, and numerical methods for improved prediction of material behaviour. Topics may include phenomenological and microstructure-informed models, parameter identification and inverse analysis, coupling with finite element or meshless methods, and the use of machine learning and optimization techniques in constitutive model development.

Keywords:

constitutive modelling; computational mechanics; material behaviour; inverse analysis; scientific machine learning

Suggested topics:

- Physics-based and multiscale constitutive models
- Parameter identification and model calibration
- Numerical implementation and validation of constitutive laws
- Optimization and inverse analysis techniques
- Data-driven and hybrid approaches (e.g., physics-informed ML)
- Coupling of experiments and simulations for material characterization