Thematic Session Proposal

Title: Numerical Approaches for Modelling Fibre-Reinforced Concrete Structures

Congress: CMN 2026 – Congress on Numerical Methods in Engineering

Dates: July 1–3, 2026

Location: Gijón, Spain

Organizers:

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Scope and Motivation

Fibre-Reinforced Concrete (FRC) represents a key advancement in modern construction materials, combining the versatility of concrete with the enhanced mechanical performance provided by fibres. Understanding and accurately predicting its behaviour under various loading and environmental conditions requires advanced numerical modelling strategies.

This thematic session aims to bring together researchers and engineers to discuss recent developments, challenges, and applications in numerical modelling of FRC across different scales and structural configurations. Contributions are welcome that bridge experimental evidence, micromechanical analysis, and large-scale structural simulations.

Topics of Interest

- Multiscale modelling of fibre–matrix interaction and bond–slip behaviour.

- Numerical formulations for discrete, smeared, and hybrid fibre representations.

- Constitutive modelling and cohesive approaches for fibre bridging and pull-out mechanisms.

- Computational strategies for dynamic, fatigue, and impact behaviour of FRC.

- Coupled thermo–hydro–mechanical modelling and durability analysis.

- Model validation through experimental and digital image correlation (DIC) data.

- Design-oriented simulation tools and applications to real-scale FRC structures.

- Machine learning and reduced-order modelling for efficient prediction.

Expected Outcomes

This session will serve as a platform for exchanging state-of-the-art research and promoting collaboration among academics and practitioners. It aims to identify key gaps and foster the development of robust, predictive, and computationally efficient models for FRC structures, supporting the transition from laboratory studies to real-world applications.

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