CONGRESS ON NUMERICAL METHODS IN ENGINEERING 2015

Thematic session proposal

1. Title of the Session:

Lightweight materials' fatigue mechanical behaviour – Numeric modelling and simulation

2. Affiliation of Organizer and Co-organizers

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3. Brief description of the theme

Nowadays, material's research community aims to achieve lighter materials with improved mechanical properties in order to be used in the transportation industry manufacturing. The main objective is to replace steels and aluminium alloys by lighter materials in order to reduce fuel consumptions and gas emissions.

At the actual state, structural light materials have special mechanical features, for instance composites, magnesium alloys, or even smart materials have peculiar mechanical behaviour that are not suitable to modulate with traditional constitutive models.

Cyclic hardening, cyclic softening or a mixed of both, different yield stresses at tension and compression are some peculiar features, among others, that can be found in structural lightweight materials.

One actual trend in material's research is to create numerical models that modulate the aforementioned special features of materials. These models are not found in FEM commercial packages and they are implemented with a strong linkage with experiments in lab.

The aim of this thematic session is to promote pedagogical, technical and practical advances in fatigue simulation based on experiments, improving and assessing new computational approaches focused in numeric modulation of material's mechanical behaviour.

It will be focused in experimental mechanics and advanced computational methods, which aim to estimate the materials mechanical behaviour in mechanical design stages.