OPTIMISATION METHODOLOGIES FOR THE TOPOLOGY AND THE ANISOTROPY FIELD OF VARIABLE STIFFNESS COMPOSITES

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ABSTRACT

Due to their excellent properties, composite materials continue to attract interest from modern industry. Moreover, new emerging technologies, like continuous filament fabrication (CFF), fused filament fabrication (FFF) and automated fibre placement (AFP), allow tailoring the structure according to the design requirements. By means of such processes one can obtain advanced composite structures wherein the tows can be steered along a curvilinear path within the optimised topology. Indeed, these technologies allow obtaining variable stiffness composites (VSCs).

Nevertheless, many issues related to the integration of some specific phenomena within the design problem formulation (e.g. damage mechanisms involved at different scales, manufacturing constraints, unavoidable defects related to the manufacturing technology, etc.) remain unsolved, essentially because of the lack of appropriate mathematical representations of the anisotropy and the topology of the composite at each pertinent scale.

The Minisymposium “Optimisation methodologies for the topology and the anisotropy field of variable stiffness composites” aims at outlining the state-of-the-art, the issues, the challenges and the perspectives in the field of VSCs manufactured through modern technologies.

Researches are invited to share new research ideas and results pertaining to all aspects of the modelling and design of VSCs.

Topics of interest include, but are not limited to

- multi-scale optimisation methodologies for variable stiffness composites
- topology optimisation
- anisotropy field representation
- fibres-path and trajectory optimisation
- failure, delamination and damage multi-scale modelling for variable stiffness composites
- formulation and integration of manufacturing requirements into the optimisation method
- post-processing techniques to obtain CAD-compatible optimised solutions