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MODELING AND SIMULATION OF TEXTILE AND FIBROUS MATERIALS

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ABSTRACT

Fibrous and textile materials are increasingly used in many applications such as composite parts for automotive and aerospace industries, biomedical materials, etc. These materials ands structures are made of fibres or filaments which are assembled by different processes (spinning, twisting, braiding, weaving, forming, etc.) and are often characterized by an internal hierarchical organisation corresponding to the successive stages of their elaboration processes, which endow them with special mechanical properties. These are made complex by interactions between geometrical features, and nonlinear and anisotropic constitutive behaviour of their elementary components at different scales.

This mini-symposium will be dedicated to the recent advances in modelling and simulation of the manufacture and mechanical behaviour of such materials and structures at different scales. Particular attention will be paid to the following issues:

- modelling and simulation of the mechanical behaviour of elementary components (tows, yarns) ;
- modelling and simulation of the different assembly and forming processes ;
- comparison of simulation results with experimental characterization, in particular using micro-tomography ;

- determination of mechanical properties at different scales ;
- prediction of defects during manufacture ;
- approach to damage in textiles materials at different scales.