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NEW CHALLENGES IN INSTABILITIES OF SLENDER STRUCTURES AND SOFT MATERIALS

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ABSTRACT

In automotive, aerospace and civil engineering fields, lowering energy consumption is a crucial objective. New challenging slender structures are investigated with the objectives of minimizing the weight and enhance their functions through, thickness reduction, new architectured metamaterials, extremely soft materials that can sustain large deformations under various stimuli, which inevitably leads to complex responses involving multiple bifurcations. Such instabilities can occur across different length scales from microscopic material level to macroscopic structural level with possible interactions. This requires novel theories, computational and experimental techniques. Advanced mathematical models are needed to quantitatively predict complex solutions involving secondary bifurcations in the post-buckling branches.

Determination of the load-bearing capacity of thin objects subject to mechanical loading or thermo-mechanical coupling, including their geometrical imperfection sensitivity, residual stresses effects, the presence of rigid or soft contact induced by adjacent structures or confinement medium, stiffened configurations and multi-layered shells and plates, complex material behaviour and curved geometries, are few examples among the new challenging problems targeted in this symposium. We hope to bring together experts working on these different aspects to review the emerging challenges and share the latest advancements in this vibrant research field. Topics of particular interest include but are not limited to :

- geometric and material instabilities in soft materials such as liquid crystalline polymers
- wrinkling, creasing, folding and ridging in extreme materials under various stimuli
- shape buckling of flexural structures such as plates, shells and membranes
- growth-induced deformations in biological tissues, biomaterials, bio-inspired structures
- micro-structural and macroscopic modelling in composites across length scales
- novel mathematical modelling method and constitution theory

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