MULTISCALE MODELING IN BIOMECHANICS
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ABSTRACT

In the last decades, Biomechanics, and in particular, reliable modeling and quantification of its parameters and constitutive models with respect to experimental observations of living tissue functionality at all scales, is a rapidly expanding field of research, whose results are critical and much awaited by a wide range of clinical applications. Furthermore, recently mechanobiology applied to medicine has gained a great attention and also including its relationship with ultrasonic field. It carries a multiscale process involving computational biology, medicine, and engineering that is revolutionizing the biofrabication processes. Mathematical models are being developed and analysed, with the aim of supporting the in vitro production process of different tissue types (e.g. large cartilage culture). These span from understanding cell biomechanics,new methods for testing them, relationship between continuum mechanics and the structure of tissue to medical specialities such as cardiovascular biomechanics, osteoarticular, reproductive, osteoarticular, regenerative biomechanics or bioprinting. In particular, the capability of models to realistically predict the various observed behavioural patterns observed in particular in soft tissue are currently under research and there is a challenging problem both from the theoretical standpoints as well as from the experimental procedure. Potential highlights include, but are not limited to, Regenerative biomechanics, Applied, experimental or theoretical tissue mechanics continuum field theory, Viscoelastic materials and hyperelastic materials, Inverse problems or biomechanical parameter identification problems, Scaffold Design and Characterization, Tissue regeneration and remodelling, Bioprinting, Computer-aided tissue engineering, Cellular mechanobiology, Tissue ultrasound mechanics, Interaction cell-tissue-biomaterial, Cellular/subcellular biomechanics, Probabilistic mechanics of evolutionary properties in tissue, Implants/orthotics/prosthetics, Soft Tissue- skin/ligaments-tendons/cartilage/other and Multiscale biomechanics.

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