

COMBINED EXPERIMENTAL AND COMPUTATIONAL METHODS TO UNDERSTAND SOFT BIOLOGICAL TISSUE BEHAVIOR

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Key words: Experimental Biomechanics, Computational Biomechanics, Coupled Problems, Multiphysics Approach

ABSTRACT

This mini-symposium promotes the integration of experimental and computational approaches in the field of biomechanics for the investigation of soft biological tissue mechanics and adaptation in health and disease.

The experimental characterization of soft biological tissues advances our understanding of the biological, chemical, and mechanical behavior of soft tissues. Similarly, computational biomechanics has provided a powerful framework to analyze and predict the behavior of complex organ systems, such as the heart, brain, skin, and biological membranes, under a vast range of circumstances, both in terms of analyzing experimental results and predicting soft tissue behavior under complex in vivo conditions.

The collection of experimental data is essential towards the calibration and validation of computer models that predict processes of growth, remodeling, and pathological alterations. These models are pivotal to investigate and optimize the adaptation and functionality of tissue-engineered implants, and to predict the consequences of treatment methods of wounds, brain injury, and membrane failure.

Specifically, the integration of in-vivo and in-vitro observations in in-silico models provides novel strategies to predict organ behavior as it undergoes mechano-bio-chemical changes upon aging, remodeling, adaptation, and disease, as in-vitro observations can be extrapolated beyond the experimental range of conditions via modeling, and the predictive capability of models is enhanced via extensive experimental input and validation.

The scope of this mini-symposium encourages the interdisciplinary effort of clinicians, biologists, engineers, and mathematicians to jointly address important challenges and trends in experimental and computational mechanics. We invite submissions related to mathematical formulations, computational modeling, and experimental contributions that elaborate on the mechanics of soft biological tissues and organs.