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MECHANICS-DRIVEN MODELING OF CELLS AND BIOLOGICAL TISSUES (400-500)

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ABSTRACT

The response of biological structures, both at the system scale (tissues, organs, and organisms) and cellular scale, to internal and external stimuli, governs their behavior in health and disease. Therefore, our ability to predict this behavior, both short-term and long-term, holds the promise of not only furthering our basic understanding of living matter, but the key to better diagnostic and therapeutic strategies. Naturally, biological processes such as cell division, cell migration, embryogenesis, wound healing, electrophysiology of neurons, active muscle response, growth, remodeling, damage, and regeneration of tissues are governed by mechanical, physical, chemical, and biological interactions. Hence, as we strive towards robust and accurate predictive models of biological structures, it is imperative to consider this multi-scale and multi-physical coupling in computational modeling.
The goal of this mini-symposium is to foster a vibrant discussion on the development of mathematical models, numerical methods, and computational simulations to study mechanics-driven phenomena across various length scales in biological systems. The scope of the phenomena being modeled can range from the cell level to the tissue and organ level. Numerical methods may cover multi-phasic material modeling, phase field modeling, particle-based methods, multi-field approaches, and inverse methods for force inference (traction and stress microscopy).