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COMPUTATIONAL MODELING OF ACTIVE BIOLOGICAL SYSTEMS TRACK NUMBER 400

SILVIA BUDDAY[†], TIM RICKEN[*], AND OLIVER RÖHRLE[*]

[†] Friedrich-Alexander University Erlangen-Nürnberg
91054 Erlangen, Germany
silvia.budday@fau.de

[*] University of Stuttgart
70569 Stuttgart, Germany
tim.ricken@isd.uni-stuttgart.de / oliver.roehrle@simtech.uni-stuttgart.de

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ABSTRACT

Computational mechanics and numerical methods are powerful tools to assist early diagnosis of diseases and advance modern treatment strategies. However, the complexity and heterogeneity of living systems poses completely new challenges and demands on mechanical models and numerical solution methods. To allow for predictive simulations, which are useful to the clinical community and can be implemented in daily clinical practice, it is essential to combine mechanics with biochemistry or electrophysiology through multi-physics modeling. These models can provide a gateway to bridge the scales from metabolic processes on the subcellular level to macroscopic continuum mechanics, to incorporate the tissue response to mechanical stimuli through coupling strategies, and to intelligently integrate experimental data for model calibration and validation. Another important challenge is to not only consider individual processes independently, but to incorporate the interplay of different functional units in the context of a whole biological system.

In this minisymposium we focus on novel approaches to master those challenges with a special emphasis on active biological systems (e.g., muscle, liver, brain, ...). We welcome highly interdisciplinary contributions bringing together the expertise of different fields such as (continuum) mechanical modeling, numerics, data science, and clinical application. The goal of this minisymposium is to create valuable synergies between researchers working on different biological systems, potentially on different scales, to bring computational modeling one step closer to clinical practice.