

Forschungskolloquium Computational Science and Engineering

Einladung zum Vortrag

Active biomechanics: Nonlocality and multiphysics modeling

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Zusammenfassung: Active biological media embrace a large class of complex biomechanical systems characterized by intrinsic nonlinearities and multiphysics couplings at different scales in space and time. Advanced theoretical frameworks and modeling approaches are required for reproducing and predicting their behavior. Despite notable efforts in the last decades, multiscale approaches are still needed to face the critical emerging phenomena arising during pathological states. The long-term vision foresees innovative devices and therapies. This talk will cover the evolution of active mechanics models currently used for the computational assessment of cardiac and gastrointestinal biomechanics. A special focus will be given to nonlocal spatiotemporal dynamics characterizing subcellular (nano) to whole-organ (cm) scale couplings considering generalized Fick's formulations, e.g., self-diffusion, stress-assisted diffusion, and fractional diffusion. Experimental and numerical examples will confirm the need for innovative ideas and multidisciplinary research, thus advancing the state-of-the-art.

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