

Mechanochemical Pattern Formation in Biological Tissues

Moritz Mercker

Heidelberg University

During embryonic development a tissue sphere develops step by step a complex organism in a process called morphogenesis. Morphogenesis is based on a variety of chemical and mechanical patterns, appearing during different stages and at different time and space scales in biological tissues. Mechanisms underlying the patterning processes are still elusive in many cases. To gain further insights into the complexity of these processes it seems important to use interactively the mathematical and experimental techniques.

The talk concerns mathematical modeling and simulation of patterning processes in biological structures such as tissues and biological membranes. Based on recent experimental data, we focus on the interplay between chemical and mechanical processes. In close collaboration with experimental biophysicists and numerical mathematicians, we apply a range of biophysical models to address biological questions including symmetry breaking in Hydra polyps and ESCRT protein-induced membrane budding.