Robust numerical methods for nonlinear and coupled diffusion problems in biology

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Short Description

This minisymposium is focused on numerical modelling of living systems such as plants or organs and related applications in engineering sciences, biology and medicine. Quite often it is observed that relevant models arising in this context are coupled nonlinear diffusion equations. Consequently, one requires robust numerical methods to solve these problems. In order to separate different scales, decouple the equations, and linearize the nonlinear terms, techniques such as multiscale modelling, domain decomposition methods, or iterative solution strategies are considered. Studying the convergence of the solvers is a relevant research field of numerical analysis and scientific computing, since it has to be investigated under which conditions such methods are converging or diverging. Apart from solving the model equations, the calibration of model parameters like tissue densities or resistances of blood vessels is an interesting issue in this field. Quite often the calibration of model parameters demands solving complex optimization problems. Only the usage of meaningful model parameters and robust solution algorithms makes it possible to produce relevant results for clinical applications. Therefore, we welcome contributions from numerical analysis, optimization and biomedical engineering.