

Modelling of coupled processes in porous media and other multiphysics problems

Organizers: Radim Blaheta (radim.blaheta@ugn.cas.cz)
Johannes Kraus (johannes.kraus@uni-due.de)
Maria Lymbery (maria.lymbery@uni-due.de)

Abstract:

Mathematical models describing processes in porous media appear in diverse fields of science and engineering, e.g. in bio-mechanics or geo-engineering. Such processes include the mechanical response to loading, flow in fully or partially saturated media, or heat transfer. In many cases, it is very important that these phenomena due to their interrelation are described and analysed as coupled problems. There are also other multiphysics problems that necessitate models coupling the individual processes, e.g., magnetohydrodynamics or piezoelectricity to mention only two examples.

Computational models of multiphysics problems involve many aspects, starting from the formulation of the model, the mathematical analysis of its properties, its discretization, and algorithms for the efficient computation of approximations of the quantities of interest. This includes the analysis of the stability and well-posedness of initial/boundary-value problems, assessment of modelling errors, the derivation of a-priori and a posteriori error estimates, the development of strategies for adaptivity, the construction of solvers and preconditioners, including iterative coupling techniques, and, last but not least, the consideration of related inverse and uncertainty quantification problems.

The aim of this minisymposium is to illustrate recent progress in the above mentioned topics.