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# UNCERTAINTY QUANTIFICATION AND INVERSE PROBLEMS

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## ABSTRACT

The parameters and inputs of numerial simulations are in many practical cases only inadequately known and hence uncertain. There is increasing demand to quantify the effect of this uncertainty on the results and outputs of simulations, which has led to the relatively new field of “uncertainty quantification”. A strong connection with stochastics exists as the uncertain quantities are often modelled probabilistically. Apart from the well-known and tried perturbation and sampling methods, there has been a rigorous development of functional approximations and spectral methods. New and very efficient numerical methods like separated tensor representations are being developed, and at the same time error indicators and adaptive methods. In parallel, (quasi) Monte Carlo methods are being accelerated through multi-level ideas. Closely connected with UQ is the task in inverse or identification problems. The possibility to efficiently compute the propagation of uncertainties through a simulation model – the so-called forward model – has made it possible to use Bayesian inverse methods of identification on large scale models, leading here to a renewed interest in different computational variants, formulations and approximations to Bayesian analysis. Also the well-known areas of filtering and smoothing – which are also connected to Bayesian methods – are getting a new impetus from this cross-connection.
This minisymposium will focus on novel numerical and computational methods for uncertainty quantification and inverse and identification problems, and their applications in engineering and science.