

Seminar series of the Graduate School GRK 2078

Referee: **Prof. Dr.-Ing. Steffen Freitag**
Head of Institute for Structural Analysis,
Karlsruhe Institute of Technology (KIT)

Dates: Thursday, November 24, 2022

Time: 15:45-16:45pm

Location: Building 10.81, Emil Mosonyi-Hörsaal (HS 62)
Please note that you can also participate in the event online

Title: **Structural Optimization under Polymorphic Uncertainty**

Abstract

The consideration of uncertain material and load parameters helps to design robust structures. However, the solution of optimization problems in structural mechanics requires to define deterministic objective functions to be minimized or maximized. This also yields for the evaluation of constraints. If structural parameters are quantified as random variables, reliability-based design optimization approaches can be applied, where statistical measures, such as mean values, variances or quantile values, of the quantities of interest are evaluated. In each optimization step, the corresponding statistical measures have to be computed by multiple runs of numerical simulation models, e.g. Monte Carlo simulations of a finite element model. This leads to a high computational effort, which is increased by additional optimization-based interval analyses, if imprecise parameters of the optimization problem are quantified by intervals or fuzzy numbers. To reduce the computation time of the multi-loop simulations (finite element analysis, Monte Carlo simulation and interval analysis), artificial neural network surrogate models are used. Applications in structural mechanics are presented with a focus on topology optimization.

You are cordially invited to take part in the event.

Prof. Dr.-Ing. Thomas Böhlke
(Spokesperson of GRK 2078)