



Masterarbeit – *Master thesis* für

Vorname Nachname

Matrikel-Nr.: XXXXXXXXX

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Efficient stochastic isogeometric analysis for large-scale and high-dimensional stochastic problems

As an extension of finite element methods, the isogeometric analysis has been proposed and applied to a variety of problems [1]. Its extensions to stochastic problems, known as stochastic isogeometric analysis, has received some attention [2,3]. In these methods, spatial discretization is achieved by means of isogeometric discretization, and stochastic solutions are approximated by the polynomial chaos expansion or the spline chaos expansion. However, it is still a challenge to use these methods to deal with large-scale and high-dimensional stochastic problems.

The main goal of this thesis is to develop a weakly intrusive isogeometric method by combining deterministic isogeometric discretization and a weakly intrusive approximation of stochastic solutions [4,5], with special emphasis on large-scale and high-dimensional stochastic problems. Numerical tests of several benchmark stochastic problems will be used to illustrate performance of the developed method.

Literatur:

- [1] J.A. COTTRELL, T.J.R. HUGHES, Y. BAZILEVS: Isogeometric Analysis: Toward Integration of CAD and FEA.
- [2] K. LI, W. GAO, D. WU, C. SONG, T. CHEN (2018): Spectral stochastic isogeometric analysis of linear elasticity. Computer Methods in Applied Mechanics and Engineering.
- [3] R. JAHANBIN, S. RAHMAN (2020): Stochastic isogeometric analysis in linear elasticity. Computer Methods in Applied Mechanics and Engineering.
- [4] Z. ZHENG, H. DAI (2021): Structural stochastic responses determination via a sample-based stochastic finite element method. Computer Methods in Applied Mechanics and Engineering.
- [5] Z. ZHENG, M. BEER, H. DAI, U. NACKENHORST (2022): A weak-intrusive stochastic finite element method for stochastic structural dynamics analysis. Computer Methods in Applied Mechanics and Engineering.