Bernoullis Tafelrunde

Graduate Student Seminar

Monday, 9 October 2023, 12:15-13:00
Seminarraum 05.002, Spiegelgasse 5

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Quantifying Domain Uncertainty in Linear Elasticity

Abstract

The numerical solution of the equations of linear elasticity are well understood if the input parameters are known. This, however, is often not the case in practical applications. In this work uncertainties in the description of the computational domain was considered. To this end, we model the random domains as the images of some given fixed, nominal domain under random domain mappings. We then prove the analytic regularity of the random solution with respect to the countable random input parameters which enter the problem through the Karhunen-Loève expansion of the random domain mappings. In particular, we provide appropriate bounds on arbitrary derivatives of the random solution with respect to those input parameters, which enable the use of state-of-the-art quadrature methods to compute deterministic statistics such as the mean and variance of quantities of interest such as the random solution itself or the random von Mises stress as integrals over the countable random input parameters in a dimensionally robust way.