Bernoullis Tafelrunde

Graduate Student Seminar

Thursday, 11 May 2017, 12:10-12:55
Seminarraum 00.003, Spiegelgasse 1

Dennis Tröndle

Universität Basel

Stochastic two-dimensional decomposition of high-dimensional solution spaces for robust design

Abstract

In the early design process of a vehicle, we would like to save resources by reducing the need for the designers to check for compatibility of their proposed vehicle components. We do this by assigning each designer an interval wherein each design is admissible. The product over all these intervals forms a high-dimensional, axis-parallel box. Given a space of admissible desgins $\Omega_{\text{ds}} \subset \mathbb{R}^n$, a threshold value $c \in \mathbb{R}$, and a scalar function $f : \Omega_{\text{ds}} \to \mathbb{R}$, a semi-infinite optimization problem can be formulated as follows: Maximize the volume $\mu(\Omega_{\text{box}})$ over all axis-parallel boxes

$$\mu(\Omega_{\text{box}}) \to \max_{\Omega_{\text{box}} \subset \Omega_{\text{ds}}}$$

subject to

$$f(\mathbf{x}) \leq c \text{ for all } \mathbf{x} \in \Omega_{\text{box}}.$$

At first, we will give a survey of an algorithm that produces these boxes. Building up on this, we show two improved algorithms that replace the axis-parallel box by either a rotated box or a polygon.