Einladung

zum Vortrag im Rahmen des **SFB Colloquiums** (Standort Linz), mit dem Titel

Quasi-Monte Carlo methods and applications

VORTRAGENDER: **Adrian Ebert**, KU Leuven
DATUM: Dienstag, 27. Februar 2018
ZEIT: 14:30 Uhr
ORT: Science Park 2, SP2 416-1, RICAM

Abstract: In this talk I present my research carried out under the supervision of Dirk Nuyens at the KU Leuven.

Firstly, the construction of good lattice rules in weighted reproducing kernel Hilbert spaces is considered. The component-by-component (CBC) algorithm for the construction of generating vectors of rank-one lattice rules in these spaces is an efficient tool, which is known to achieve the optimal rate of convergence in terms of the worst-case error in the respective spaces. However, this construction does not deliver the best possible rank-one lattice. We present a generalized successive coordinate search (SCS) algorithm which, based on an initial generating vector, admits the same type of worst-case error upper bounds as the CBC construction. A fast version of the proposed algorithm in the spirit of Nuyens and Cools is available reducing the construction cost to O(s n log(n)). We present some numerical results which demonstrate that the SCS algorithm can construct better lattice rules than the CBC construction. Analogous results also hold for polynomial lattice rules.

Secondly, we investigate the problem of parameter identification of a mathematical model using uncertain data. In particular, we consider the human insulin-glucose system which can be modelled by a system of parameter-dependent differential equations and aim to estimate parameters such as insulin sensitivity. To identify the desired parameters, we apply the concept of Bayesian inversion in combination with quasi-Monte Carlo point sets. This way we intend to achieve a faster convergence rate in contrast to often used Markov chain Monte Carlo (MCMC) methods. The uncertainty enters the system in several ways as we deal with noisy measurement data, uncertain model parameters and modelling assumptions.

Das **SFB Colloquium** wird vom **FWF Special Research Program (SFB) Quasi-Monte Carlo Methods: Theory and Application** unterstützt