

Veranstaltungen im Sommersemester 2018

Das einunddreißigste Treffen des Rhein-Main Arbeitskreises findet am

Freitag, den 6. Juli 2018

an der

**[TU Darmstadt, Fachbereich Mathematik,](#)
Dolivostrasse 15**

statt.

Programm

15:15 Uhr: [Prof. Dr. Claudia Schillings \(Universität Mannheim\)](#)

Uncertainty Quantification for Inverse Problems

Uncertainty Quantification is an interesting, fast growing research area aimed at developing methods to address the impact of parameter, data and model uncertainty in complex systems. In this talk we will focus on the identification of parameters through observations of the response of the system - the inverse problem. The uncertainty in the solution of the inverse problem will be described via the Bayesian approach. In cases, where the model evaluations are prohibitively expensive, ad hoc methods such as the Ensemble Kalman Filter (EnKF) for inverse problems are widely and successfully used by practitioners in order to approximate the solution of the Bayesian problem. The low computational costs, the straightforward implementation and their non-intrusive nature make them appealing in various areas of application, but, on the downside, they are underpinned by very limited theoretical understanding. In this talk, we will discuss an analysis of the EnKF based on the continuous time scaling limits, which allows to derive estimates on the long-time behaviour of the EnKF and, hence, provides insights into the convergence properties of the algorithm.

16:00 Uhr: Tee/Kaffee

16:30 Uhr: [Prof. Dr. Markus Hansen \(Universität Marburg\)](#)

Inferring Interaction Rules from Observations of Evolutive Systems

In this talk we are concerned with the learnability of nonlocal interaction kernels for first order systems modeling certain social interactions, from observations of realizations of their dynamics. In particular, we assume here that the kernel to be learned is bounded and locally Lipschitz continuous and that the initial conditions of the systems are drawn identically and independently at random according to a given initial probability distribution. Then the minimization over a rather arbitrary sequence of (finite dimensional) subspaces of a least square functional measuring the discrepancy from observed trajectories produces uniform approximations to the kernel on compact sets. The convergence and its rate are obtained by combining mean-field limits, transport methods, and a Γ -convergence argument.

A crucial condition for the learnability is a certain coercivity property of the least square functional, majoring an L_2 -norm discrepancy to the kernel with

respect to a probability measure, depending on the given initial probability distribution by suitable push forwards and transport maps. We illustrate the convergence result by means of several numerical experiments.

17:15 Uhr: [Dr. Kersten Schmidt \(TU Darmstadt\)](#)

A High Order Galerkin Method for the Approximation of Contour Integrals

We introduce a novel method to compute approximations of contour integrals in some bounded domain in $\Omega \subset \mathbb{R}^d$. The new method is based on the coarea formula in combination with a Galerkin projection. As such it fits seamlessly into the spirit of hp/spectral finite element methods and circumvents the expensive and technical computation of contours. Only integrals over the domain Ω have to be evaluated. We provide convergence estimates showing that a high order convergence can be achieved provided that the data is sufficiently smooth. Moreover, we analyze the contribution to the discretization error if an approximated level set function, e.g. its Galerkin approximation, is used. The theoretical results are supplemented by numerical experiments and an example application for plasma modeling in nuclear fusion.

Nachsitzung im [Restaurant Khan: Der mongolische Grill](#) (ca. um 18:15 Uhr).

anschließend: Rückmeldung hierzu bitte spätestens bis zum 22. Juni 2018 an Frau Dehnert (dehnert@mathematik.tu-darmstadt.de).

Informationen zur Anreise finden Sie [auf dieser Seite](#).