Fakultät für Mathematik

Berufungsvorträge „Applied Mathematics and Modeling“

Mittwoch, 9. November, 9:00 Uhr, D 103: **Prof. Dr. Carsten Wiuf** **(Aarhus University, BiRC)**

9:00 Uhr: Vortrag für Studierende (20 Minuten):
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Abstract:

9:30 Uhr: Wissenschaftlicher Vortrag:
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Abstract:

Mittwoch, 9. November, 15:00 Uhr, C 209: **Prof. Dr. Peter Szmolyan** **(TU Wien, Institut für Analysis und Scientific Computing)**

15:00 Uhr: Vortrag für Studierende (20 Minuten):
„Langsame Mannigfaltigkeiten: aus singulär wird regulär“

15:30 Uhr: Wissenschaftlicher Vortrag:
„Multiscale Dynamical Systems: Modelling meets Analysis“

Abstract:

Freitag, 11. November, 10:00 Uhr, C 209: **Prof. Dr. Nicole Marheineke** **(FAU Erlangen-Nürnberg, Angewandte Mathematik I)**

10:00 Uhr: Vortrag für Studierende (20 Minuten):
„Asymptotische Modellierung“

10:30 Uhr: Wissenschaftlicher Vortrag:
„Asymptotic models and stochastic surrogates for the efficient simulation of fiber-fluid interactions“

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Freitag, 11. November, 14:00 Uhr, C 209:

Prof. Dr. Massimo Fornasier
(TU München, Fak. Mathematik, Angew. Numerische Analysis)

14:00 Uhr: Vortrag für Studierende (20 Minuten):
„A simple model of flocking of birds“

Abstract: We present the Cucker and Smale model of flocking of birds, which is a dynamical system describing N moving particles which interact according to the mutual distance. The mutual social forces act on the agents to align their velocities, with the scope of having an emerging consensus on the direction of the whole group.
We shall show how the strength of the interactions will affect the ability of the group to make emerging a consensus.

14:30 Uhr: Wissenschaftlicher Vortrag:
„Analysis and Simulation of Particle Systems and Kinetic Equations Modeling Interacting Agents in High Dimension“

Abstract: We are addressing the analysis and the tractable simulation of dynamical systems which are modeling the behavior in a social context of a large number N of complex interacting agents described by a large amount of parameter (high-dimension).We are facing the following fundamental challenges and by describing them in detail we are also pointing to new research directions:
- Random projections and recovery for high-dimensional dynamical systems: we shall explore how concepts of data compression via Johnson-Lindenstrauss random embeddings onto lower-dimensional spaces can be applied for tractable description and simulation of complex dynamical interactions. As a fundamental subtask for the recovery of high-dimensional trajectories from low-dimensional simulated ones, we will address the efficient recovery of point clouds defined on embedded manifolds from random projections.
- Mean field equations: for the limit of the number N of agents to infinity, we shall further explore how the concepts of compression can be generalized to work for associated mean field equations.
- Approximating functions in high-dimension: differently from purely physical problems, in the real life the social forces which are ruling the dynamics are actually not known. Hence we will address the problem of automatic learning from collected data the fundamental functions governing the dynamics.
- Sparse optimal control in high-dimension and mean field optimal control: while self-organization of such dynamical systems has been so far a mainstream, we will focus on their sparse optimal control in high-dimension, modeling best policies. We will investigate L1-minimization to design sparse optimal controls. We will learn high-dimensional (sparse) controls by random projections to lower dimension spaces and we will address the problem of formulating properly their mean field limit.