Multiscale Dynamical Systems near Instability

Initiative: Lichtenberg - Professuren

Bewilligung: 09.06.2016

Laufzeit: 5 Jahre

Projekt-Website: www.multiscale.systems

The main theme of the professorship is to design, study and implement mathematical methods for nonlinear multiscale dynamical systems. At the interfaces of various mathematical disciplines linking analysis, computing, dynamics, geometry, modelling, numerics and stochastics better quantitative methods will be developed to provide insight into complex systems arising in the natural sciences and engineering.The recent strong emergence of fields such as neuroscience, systems biology, climate science, sustainability, network science, econophysics and many others has demonstrated that future mathematical techniques should aim to link the viewpoint of well-controlled small-scale models to complex systems. The approach via multiscale structures and perturbation techniques has a tremendous potential to yield key results and novel techniques. The goal is to contribute at the interface of (1) rigorous analysis of multiscale methods, (2) design of numerical algorithms and (3) transfer to and from applications. The main research focus will be to study dynamical systems near instability, where drastic changes of the system occur. In this regime, various nominally small effects, such as time scale separation, noise or nonlocality, are in crucial interaction with each other.

Projektbeteiligte

Prof. Christian Kühn
Technische Universität München
Fakultät für Mathematik
Garching

Open Access-Publikationen

Computing invariant sets of random differential equations using polynomial chaos
Power network dynamics on graphons
Discretized fast-slow systems near transcritical singularities
Rough center manifolds
A universal route to explosive phenomena

Es werden die Institutionen genannt, an denen das Vorhaben durchgeführt wurde, und nicht die aktuelle Adresse.

28.04.2024

2