

Einladung

zum

Mathematischen Kolloquium

Am **Mittwoch**, dem 10. Juli 2019, spricht

Herr Prof. Dr. Patrick Farrell,
Mathematical Institute, University of Oxford, England
Gast am Lehrstuhl für Angewandte Mathematik
bei Herrn Prof. Dr. Anton Schiela

über das Thema

Computing disconnected bifurcation diagrams of partial differential equations

Abstract

Computing the distinct solutions u of an equation $f(u, \lambda) = 0$ as a parameter $\lambda \in \mathbb{R}$ is varied is a central task in applied mathematics and engineering. The solutions are captured in a bifurcation diagram, plotting (some functional of) u as a function of λ . In this talk I will present a new algorithm, deflated continuation, for this task. Deflated continuation has three advantages. First, it is capable of computing disconnected bifurcation diagrams; existing algorithms only aim to compute that part of the bifurcation diagram continuously connected to the initial data. Second, its implementation is extremely simple: it only requires a minor modification to an existing Newton-based solver. Third, it can scale to very large discretisations if a good preconditioner is available. Among other problems, we will apply this to a famous singularly perturbed ODE, Carrier's problem. The computations reveal a striking and beautiful bifurcation diagram, with an infinite sequence of alternating pitchfork and fold bifurcations as the singular perturbation parameter tends to zero. The analysis yields a novel and complete taxonomy of the solutions to the problem. We will also apply it to discover previously unknown solutions to various equations arising in liquid crystals and quantum mechanics.

Beginn: 16.30 Uhr (Kaffee/Tee ab 16.00 Uhr im S 748)

Ort: Hörsaal **H 16**, Gebäude Naturwissenschaften II, Universitätsgelände

gez. M. Birke