Karlsruhe Institute of Technology

Seminar of the Work Group
Nonlinear Partial Differential Equations
WS 21/22

Speaker:Kevin Drescher
October 22, 2021, 14:00 - 15:30
Seminar room: 3.069

Computer-assisted existence proofs for nonlinear 2nd order elliptic boundary value problems in divergence form

KIT

Abstract

In this talk a computer-assisted method for nonlinear elliptic boundary value problems, which gives not only the existence and local uniqueness of solutions, but also an enclosure of these, is presented. We consider second-order differential equations in divergence form with Dirichlet boundary conditions. We focus in particular on problems with discontinuous leading coefficients, but also quasilinear problems where the leading coefficients depend on the solution itself are of interest. An application is the stationary heat equation with discontinuous material-dependent or with temperature-dependent diffusion coefficients, respectively. This method is based on a fixed-point formulation and includes numerical computations. In order to make the proof rigorous, all numerical errors are taken into account.
Numerical results in a one-dimensional setting will be presented.