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FAKULTÄT FÜR MATHEMATIK
Dekan Univ.-Prof. Dr. Christian Krattenthaler

Einladung zur öffentlichen Defensio von

Dong Guozhi

Thema der Dissertation:

Regularization and Imaging Methods for Solving Inverse Problems with Solutions on Surfaces

Abstract:
Regularization methods are standard approaches for solving ill-posed problems from incomplete and noisy measurements. Inverse and imaging problems are typically ill-posed. Some recent developments in these areas tend to investigate problems with solutions lying on non-Euclidean domains, and to study non-convex regularization and related issues in theory and applications. The thesis partially responds to the new trends. We mostly considered problems in a setting of infinite dimensional function spaces, which are numerically simulated within finite dimensional spaces.
In the presentation, mainly the following three aspects will be sketched:
(1) A general theory on Tikhonov regularization for solving ill-posed problems of which both the measurements and solutions are defined on surfaces: This theory allows to take into account surface disturbance. In particular, it is the first time that a convergence analysis is studied for regularization methods on problems of which the solutions are vector fields on surfaces.
(2) Two families of novel nonlinear flows from non-convex regularization energies which are reduced from continuous optimization models for correcting displacement errors in image data: Some properties on the behavior of the solutions of these PDEs are studied by numerical analysis. The flows have applications in dejittering and fixing angular sampling errors in tomography.
(3) A method to distinguish different scales of the segmented edge set of an image: This method is based on a newly proposed iterative approach which uses topological derivatives to approximate the minimizers of the Mumford-Shah functional.

Prüfungssenat:

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Zeit: Freitag, 24. März 2017, 08:00 Uhr

Ort: Fakultät für Mathematik, Vis Lab Raum 1.313, Oskar-Morgenstern-Platz 1