Mathematisches Forschungsinstitut Oberwolfach

Mini-Workshop: Statistical Methods for Inverse Problems

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ABSTRACT. Inverse problems appear naturally in a broad range of applications. Numerical analysis and statistics have – often independently – developed methods for regularisation and inversion. The aim of this mini-workshop is to bring together these methods and to consider their use in applications, with a focus on mathematical finance.

Introduction by the Organisers

The mini-workshop on "Statistical methods for inverse problems" gathered seventeen people from the area of statistics and numerical analysis. The goal of the workshop was to stimulate discussions around results and methods that are commonly used by different scientific communities. These methods mainly concern regularization of linear and nonlinear inverse problems in presence of deterministic or stochastic noise.

The week was articulated around three main lectures, divided into two talks each. Yuri Golubev (Université of Marseille) started on Monday-Tuesday mornings to give an extended lecture on inverse problems from a statistical perspective. He was quickly followed by Thorsten Hohage (University of Göttingen) who gave lectures on Monday-Tuesday afternoon on inverse problems from a numerical analysis perspective. A third lecture was given on Wednesday-Thursday morning by Rama Cont (École Polytechnique) who addressed the issue of inverse problems in finance, with both deterministic and probabilistic points of view. The main talks were completed by informal contributed talks of approximately one hour each, at the approximate rate of two talks per day except for the mandatory walk in the Schwarzwald, which was unfortunately canceled due to bad weather conditions that concentrated on the only day of rest!

Round tables were planned to follow the lectures, but the friendly and informal atmosphere soon raised constant questions and discussions among the participants during the lectures so that the workshop progressively moved to informal, yet intense scientific discussions: particular focus was given on optimal tuning parameter choice, stochastic or deterministic error modeling and the complexity of numerical schemes. These discussions took place during several extended talks that skipped the initially planned schedule, fortunately tightened by the strict meal hours of the Oberwolfach center.

The excellent atmosphere of the mini-workshop was made possible thanks to the exceptional working conditions at the MFO to which we would like to express our deep gratitude.

Marc Hoffmann and Markus Reiß