

Title: Numerical Methods in Discrete Inverse Problems

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Abstract: Inverse problems represent a broad class of problems of reconstructing unknown quantities from measured data. A common characteristic of these problems is high sensitivity of the solution to perturbations in the data. The aim of numerical methods is to approximate the solution in a computationally efficient way while suppressing the influence of inaccuracies in the data, referred to as noise, that are always present. Properties of noise and its behavior in regularization methods play crucial role in the design and analysis of the methods. The thesis focuses on several aspects of solution of discrete inverse problems, in particular: on propagation of noise in iterative methods and its representation in the corresponding residuals, including the study of influence of finite-precision computation, on estimating the noise level, and on solving problems with data polluted with noise coming from various sources.

Keywords: discrete inverse problems, iterative solvers, noise estimation, mixed noise, finite-precision arithmetic