



Rank-Deficient and Discrete Ill-Posed Problems: Numerical Aspects of Linear Inversion (Monographs on Mathematical Modeling and Computation)

By Per Christian Hansen

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Here is an overview of modern computational stabilization methods for linear inversion, with applications to a variety of problems in audio processing, medical imaging, seismology, astronomy, and other areas. Rank-deficient problems involve matrices that are exactly or nearly rank deficient. Such problems often arise in connection with noise suppression and other problems where the goal is to suppress unwanted disturbances of given measurements. Discrete ill-posed problems arise in connection with the numerical treatment of inverse problems, where one typically wants to compute information about interior properties using exterior measurements. Examples of inverse problems are image restoration and tomography, where one needs to improve blurred images or reconstruct pictures from raw data. This book describes new and existing numerical methods for the analysis and solution of rank-deficient and discrete ill-posed problems. The emphasis is on insight into the stabilizing properties of the algorithms and the efficiency and reliability of the computations.

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