Bernoullis Tafelrunde

Graduate Student Seminar

Thursday, 22. November 2018, 12:15-13:00
Seminarraum 05.002, Spiegelgasse 5

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Adaptive Eigenspace Inversion for Breast Tumour Detection

Abstract

Breast cancer detection is still a challenging topic. In this thesis we explore a different approach to detect potential tumours in breast tissue: the use of accoustic waves and the Helmholtz equation. We give two algorithms to solve the inverse Helmholtz problem. We start with a truncated Gauss-Newton algorithm and based on it, present the Adaptive Eigenspace Inversion. We explore some numerical properties of the Eigenspace expansion and discuss why the resulting basis is suitable for our inverse problem. We use a 2D model of a breast to evaluate the capability of the algorithms to reconstruct the tissue and detect a breast tumour. We assess our methods in a series of increasingly realistic settings and compare how those different settings affect the result. In addition, we analyse the influence of the regularisation parameter of the Adaptive Eigenspace Inversion. Finally, we present and compare multiple ways to treat missing boundary information.