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Professur Inverse Probleme am Lehrstuhl für Mathematik IX

Quantitative magnetic resonance imaging as inverse problem

In the field of MRI several different reconstruction methods exist to compute specific tissue properties encoded in relaxation times. MRI is based on nuclear magnetic resonance and does not rely on X-rays or ionizing radiation. It has been shown that a Levenberg-Marquardt algorithm is capable of reconstructing the parameters of interest.

This master's project is about understanding and implementing a corresponding forward model based on a discretization of the underlying Bloch dynamics. Since the forward problem is nonlinear, the corresponding Fréchet derivative and its adjoint are also explicitly derived and implemented with or without a matrix representation. As first attempt, the iterative Gauss-Newton Method (IRGNM) was used, but it turned out that an accurate solution of the corresponding linear systems in each step is unfeasible. Therefore, it was decided to switch to Landweber iteration.

As the project is still in process, the talk will cover the theoretical background and the results achieved by the day of the talk.

Ort: Raum 30.02.003 (Mathematik West, 2.Stock)   Zeit: Donnerstag, 26.06.2025, 12:00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.
You are cordially invited to this lecture.

gez. Prof. Dr. Alfio Borzì
gez. Prof. Dr. Frank Werner