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Volker Michel* (michel@mathematik.uni-siegen.de), Geomathematics Group, University of Siegen, Walter-Flex-Str. 3, Siegen, 57068. *Regularization of Tomographic Inverse Problems in Geophysics.*

Examples for tomographic problems in geophysics are the modeling of the Earth's interior and the detection of mass transports from GRACE data. Classical approaches such as a subdivision into blocks or the expansion in orthogonal polynomials have well-known disadvantages such as numerical instabilities or an insufficient flexibility with respect to inhomogeneous data sets.

This talk presents an overview of the following regularization methods based on localized trial functions developed by the speaker and his research group. These tools are able to overcome the drawbacks of classical approaches.

- A wavelet method uses hat-functions with varying hat-widths providing a multiresolution analysis.
- A spline method uses a different set of hats, which are constructed in correspondence with the data grid, such that the resolution of the result is locally adapted to the data density.
- The Regularized Functional Matching Pursuit represents a novel algorithmic approach, which can combine the advantages of splines and wavelets and avoids some of their drawbacks. In particular, very large data sets (e.g., from satellite missions) can be handled and heterogeneous systems of trial functions may be used.

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