

***Y*-Scale Regularization**

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Abstract:

Inverse problems are typically ill-posed in the sense that their solution is unstable with respect to data perturbations, and hence *regularization methods* have to be used for their stable solution. The analysis of such methods is governed by the mapping properties of the involved operators and smoothness of the data and the solution with respect to the operator. A-priori knowledge on the smoothing properties of the operator can be utilized, e.g., for

- acceleration of iterative regularization methods
- dealing with very high/unbounded noise.

Hilbert Scales provide a framework to analyse mapping properties of operators and relate them to the more intuitive smoothness measure of differentiability. We will utilize a Hilbert Scale over the image space of the operator under consideration and design a parameterized family of modified iterative regularization methods that allow to address both aims mentioned above. We present the main ingredients of the convergence analysis of such *Y*-scale methods and illustrate the advantages in numerical examples.