M. ZHARIY

Sparse and Adaptive Methods for Solving Linear Ill-posed Inverse Problems

Institute for Industrial Mathematics, Johannes Kepler University Linz, Austria
E-mail: zhariy@indmath.uni-linz.ac.at

We emphasize on solving linear operator equations $Ax = y$ with unbounded inverse A^{-1} and perturbed data y^δ with $\left\|y^\delta - y\right\| < \delta$ for some $\delta > 0$. It is a known fact that the truncation of the *Landweber iteration* $x_{n+1} = x_n - \beta(A^*Ax_n - A^*y^\delta), \quad n \geq 0, x_0 = 0$ at some step $n_* = n_*(\delta)$, typically chosen by *Morozov's discrepancy principle* $\left\|Ax_n - y^\delta\right\| \leq \tau\delta$, yields a stable approximation to the solution of $Ax = y$.

In [1] we develop an adaptive approximation of the Landweber iteration. We select the depth of approximation in each step and the truncation index n_* with respect to the Morozov's discrepancy principle and show that the result of the truncated Landweber iteration evaluated on the adaptive grid approaches the solution of $Ax = y$ in a stable way for $\delta \to 0$.

[1] R. Ramlau and G. Teschke and M. Zhariy , "A compressive Landweber iteration for solving ill-posed inverse problems", *Inverse Problems* **24**, (2008), 26pp.