ITERATED $\ell^2 - \ell^q$ REGULARIZATION

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In many areas of science and engineering we are faced by linear inverse problems. The solution of this kind of problems is very sensitive to perturbations in the data. To reduce the sensitivity of the computed solution to perturbations in the data, one employs regularization. Instead of solving the original problem, one may solve an ℓ^2-ℓ^q minimization problem, i.e., one minimizes a weighted sum of a squared Euclidean norm of a fidelity term and the qth power of the ℓ^q-norm with $0 < q \leq 2$ of a regularization term, where we note that the "ℓ^q-norm" does not satisfy all properties of a norm for $0 < q < 1$, see, e.g., [2, 3] and references within. This poster describes an iterated variant of this regularization approach [1]. It is known that iterated variants of Tikhonov regularization yields computed solution of higher quality than "standard" Tikhonov regularization. We show that iterated ℓ^2-ℓ^q minimization gives computed solutions of higher quality than standard ℓ^2-ℓ^q minimization. Computed examples illustrate the performance of the proposed method.

References

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