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A two-dimensional minimum residual technique for accelerating two-step iterative solvers[1]

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Abstract

In this talk, we present a technique to speed up the convergence of a class of two-step iterative methods for solving linear systems of equations. To implement the acceleration technique, the residual norm associated with computed approximations for each sub-iterate is minimized over a certain two-dimensional subspace. Convergence properties of the resulting method will be discussed in detail. It will be further shown that the approach can be developed to solve (regularized) normal equations arising from the discretization of ill-posed problems. Numerical experiments will be disclosed to illustrate the performance of exact and inexact variants of the method for some test problems.

Keywords: Iterative methods, minimum residual technique, convergence, normal equations, ill-posed problems

Mathematics Subject Classification [2010]: 65F10

References

[1] F. P. A. Beik, M. Benzi, M. Najafi-Kalyani, A two-dimensional minimum residual technique for accelerating two-step iterative solvers with applications to discrete ill-posed problems, Preprint, https://arxiv.org/abs/2303.12473.

[1]The presented results in this talk are the summary of authors' recently submitted manuscript which is accessible in Arxiv, see [1].

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