Electronic Transactions on Numerical Analysis.
Volume 37, pp. 23-40, 2010.

ISSN 1068-9613.

ETNA
Kent State University
http://etna.math.kent.edu

BLOCK APPROXIMATE INVERSE PRECONDITIONERS FOR SPARSE NONSYMMETRIC LINEAR SYSTEMS*

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Abstract. In this paper block approximate inverse preconditioners to solve sparse nonsymmetric linear systems with iterative Krylov subspace methods are studied. The computation of the preconditioners involves consecutive updates of variable rank of an initial and nonsingular matrix A_0 and the application of the Sherman-Morrison-Woodbury formula to compute an approximate inverse decomposition of the updated matrices. Therefore, they are generalizations of the preconditioner presented in Bru et al. [SIAM J. Sci. Comput., 25 (2003), pp. 701–715]. The stability of the preconditioners is studied and it is shown that their computation is breakdown-free for H-matrices. To test the performance the results of numerical experiments obtained for a representative set of matrices are presented.

Key words. approximate inverse preconditioners, variable rank updates, block algorithms, Krylov iterative methods, Sherman-Morrison-Woodbury formula

AMS subject classifications. 65F10, 65F35, 65F50

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*Received December 10, 2004. Accepted for publication May 21, 2009. Published online on February 28, 2010. Recommended by M. Benzi. Supported by Spanish Grant MTM2007-64477.

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