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J. Cerdán, D. Guerrero, J. Marín, J. Mas

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Preconditioners for nonsymmetric linear systems with low-rank skew-symmetric part*

J. Cerdán[1], D. Guerrero[2], J. Marín[1], J. Mas[1]

Abstract

We present a preconditioning technique for solving nonsymmetric linear systems $Ax = b$, where the coefficient matrix A has a skew-symmetric part that can be well approximated with a skew-symmetric low-rank matrix. The method consists of updating a preconditioner obtained from the symmetric part of A. We present some results concerning to the approximation properties of the preconditioner and the spectral properties of the preconditioning technique. The results of the numerical experiments performed show that our strategy is competitive compared with some specific methods.

Keywords: Iterative methods, skew-symmetric matrices, sparse linear systems, preconditioning, low-rank update.

2000 MSC: 15B57, 45A05, 65F08, 65F10, 65F50, 65N22

1. Introduction

In this paper we study the iterative solution of nonsingular, nonsymmetric linear systems

$$Ax = b \tag{1}$$

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Email addresses: jcerdan@imm.upv.es (J. Cerdán), danguefl@doctor.upv.es (D. Guerrero), jmarinma@imm.upv.es (J. Marín), jmasm@imm.upv.es (J. Mas)

[1]Institut de Matemàtica Multidisciplinar, Universitat Politècnica de València, 46022 València, España.

[2]Departamento de Ciencias Matemáticas, Universidad Pedagógica Nacional Francisco Morazán, Honduras.