Electronic Transactions on Numerical Analysis.
Volume 12, pp. 88-112, 2001.

ISSN 1068-9613.

ETNA
Kent State University
etna@mcs.kent.edu

ON PARALLEL TWO-STAGE METHODS FOR HERMITIAN POSITIVE DEFINITE MATRICES WITH APPLICATIONS TO PRECONDITIONING*

M. JESÚS CASTEL†, VIOLETA MIGALLÓN†, AND JOSÉ PENADÉS†

Abstract. Parallel two-stage iterative methods for the solution of linear systems are analyzed. Convergence properties of both block and multisplitting two-stage methods are investigated either when the number of inner iterations becomes sufficiently large or when the matrix of the linear system is Hermitian positive definite. Comparison theorems for the parallel two-stage methods, based on the number of inner iterations performed, are given. Computational results of these methods on two parallel computing systems are included to illustrate the theoretical results. Also, the use of these methods as preconditioners is studied from the experimental point of view.

Key words. linear systems, two-stage methods, block methods, multisplitting methods, Hermitian matrix, positive definite matrix, preconditioners, parallel algorithms, monotonicity, distributed memory.

AMS subject classifications. 65F10, 65F15.

*Received July 29, 1999. Accepted for publication March 22, 2001. Recommended by D. B. Szyld.

†Departamento de Ciencia de la Computación e Inteligencia Artificial, Universidad de Alicante, E-03071 Alicante, Spain. This research was supported by Spanish DGESIC grant number PB98-0977. E-mail: `chus@dccia.ua.es, violeta@dccia.ua.es, jpenades@dccia.ua.es`