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ETNA
Kent State University
etna@mcs.kent.edu

ASYNCHRONOUS WEIGHTED ADDITIVE SCHWARZ METHODS*

ANDREAS FROMMER†, HARTMUT SCHWANDT‡, AND DANIEL B. SZYLD§

Abstract. A class of asynchronous Schwarz methods for the parallel solution of nonsingular linear systems of the form $Ax = f$ is investigated. This class includes, in particular, an asynchronous algebraic Schwarz method as well as asynchronous multisplitting. Theorems are obtained demonstrating convergence for the cases when A^{-1} is nonnegative and when A is an H-matrix. The results shown are for both the situations with or without overlap between the domains in which an underlying mesh is divided, if such a mesh exists. Numerical experiments on systems of up to over ten million variables on up to 256 processors are presented. They illustrate the convergence properties of the method, as well as the fact that when the domains are not all of the same size, the asynchronous method can be up to 50% faster than the corresponding synchronous one.

Key words. Asynchronous methods, monotone matrices, H-matrices, linear system, parallel algorithms, multisplittings, additive Schwartz.

AMS subject classifications. 65F10, 65Y05.

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†Fachbereich Mathematik, Bergische Universität GH Wuppertal, D-42097 Wuppertal, Germany, frommer@math.uni-wuppertal.de

‡Fachbereich Mathematik, Technische Universität Berlin, D-10623 Berlin, Germany, schwandt@math.tu-berlin.de

§Department of Mathematics, Temple University, Philadelphia, Pennsylvania 19122-2585, USA, szyld@math.temple.edu. Supported in part by National Science Foundation grants INT-9123273 and DMS-9625865