Electronic Transactions on Numerical Analysis.
Volume 15, pp. 18-28, 2003.

ISSN 1068-9613.

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AN ADDITIVE SCHWARZ PRECONDITIONER FOR THE SPECTRAL ELEMENT OCEAN MODEL FORMULATION OF THE SHALLOW WATER EQUATIONS *

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Abstract. We discretize the shallow water equations with an Adams-Bashford scheme combined with the Crank-Nicholson scheme for the time derivatives and spectral elements for the discretization in space. The resulting coupled system of equations will be reduced to a Schur complement system with a special structure of the Schur complement. This system can be solved with a preconditioned conjugate gradients, where the matrix-vector product is only implicitly given. We derive an overlapping block preconditioner based on additive Schwarz methods for preconditioning the reduced system.

Keywords: Shallow water equations, h-p finite elements, adaptive grids, multigrid, parallel computing, conjugate gradients, additive Schwarz preconditioner.

AMS subject classifications. 68W10, 65Y05, 47N40, 76D33

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* This research has been partially supported by NSF grants DMS-9707040, ACR-9721388, ACR-9814651, CCR-9902022, and CCR-9988165, and National Computational Science Alliance grant OCE980001 (utilizing the University of Illinois Origin 2000 and the University of New Mexico Los Lobos systems). Received May 23, 2001. Accepted for publication October 19, 2001. Recommended by Jan Mandel.

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