Douglas, Craig C.; **Haase, Gundolf**; **Iskandarani, Mohamed**

An additive Schwarz preconditioner for the spectral element ocean model formulation of the shallow water equations. (English) Zbl 1041.68127

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Summary: 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 he 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.

MSC:

68W10 Parallel algorithms in computer science
65Y05 Parallel numerical computation
47N40 Applications of operator theory in numerical analysis
76D33 Waves for incompressible viscous fluids

Keywords:

shallow water equations; *h-p* finite elements; adaptive grids; multigrid; parallel computing; conjugate gradients; additive Schwarz preconditioner