

An Interface Strip Preconditioner for Domain Decomposition Methods: Applications in hydrology.

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Abstract

In this paper, we report our work on applying Krylov iterative methods [1, 2], accelerated by parallelizable Interface Strip preconditioner for Domain Decomposition methods [3], to the solution of non-symmetric linear equations arising from implicit/explicit (or semi-implicit) time discretization (i.e. via finite element method) of the Saint-Venant system of conservation laws for open channel flows. The preconditioner proposed in [3] is based on solving a problem in a narrow strip around the interface. It requires much less memory and computing time than classical Neumann-Neumann preconditioner [4], and handles correctly the flux splitting among subdomains that share the interface. The performance of this preconditioner is assessed with an analytical study of Schur complement matrix eigenvalues and numerical experiments conducted in a parallel computational environment (i.e. Beowulf cluster) in a production code [5].

keywords: domain decomposition, preconditioner, parallel computing, Saint-Venant eqs., Open Channel flow.

References

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