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Kirill Voronin*, kirill.v.voronin@gmail.com. *Multigrid with local Schwarz-type smoothers for space-time CFOSLS.*

We present a modified smoother in a geometric multigrid method which is used as a preconditioner for solving various classical PDEs in constrained space-time first-order system least squares (CFOSLS) framework. Space-time (in 3D/4D) CFOSLS formulations of transport, heat and wave equations lead after finite element discretization to saddle-point sparse linear systems where the divergence constraint represents the original equation.

One of the approaches to solve such systems is to find a particular solution which satisfies the divergence constraint, and then look for a divergence-free correction using a conjugate gradient method. To make this approach feasible an efficient preconditioner is required which acts in the divergence-free subspace.

Geometric multigrid can be used as a preconditioner provided that it works in the appropriate subspace. The main idea of the presented work is to combine a local Schwarz-type smoother with a standard Gauss-Seidel smoother. This allows an efficient CFOSLS functional minimization and significantly reduces iteration count in 4D. A numerical study of the proposed multigrid method in terms of convergence and scalability is presented. (Received February 05, 2018)