

A preconditioned GMRES solver with algebraic multigrid accelerations for the fluid-structure interaction problems

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In this paper, we propose a preconditioned GMRES method for solving a Schur complement equation of the coupled fluid-structure interaction system, with respect to the displacement unknowns only on the interface. The preconditioning for the interface equation requires approximate solutions of the structure and the fluid sub-problems, with respectively prescribed Robin boundary conditions on the interface for each sub-problem. The solutions of both sub-problems are approximated by very few W-cycles of special algebraic multigrid methods applied to a symmetric and positive definite system and a saddle point system from the discretized structure and the fluid sub-problems, respectively. Both sub-problems are discretized by the finite element method on hybrid meshes. The application of these W-cycles enhances the performance of solving the interface equation.

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