

Iterative solvers for large-scale linear and non-linear systems

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Abstract

We present efficient and robust preconditioning techniques and iterative solvers combined with primal-dual set method for solving large-scale optimization problems with equality and inequality constraints. The solution of the primal and dual variables are solved simultaneously with well-integrated projection processus. Our tools are the primal-dual active set method (or equivalently, semismooth Newton method [1]) for the inequality constraints, an approximate block triangular preconditioner factorization of the KKT matrix and an acceleration technique based on Krylov subspace solver. We believe that these ingredients are essential for a successful primal-dual active set strategy for large-scale optimization problems. We focus on the numerical solution of three-dimensional elasticity problems with unilateral contact constraints. Some numerical results are presented to show the potential, efficiency and accuracy of the proposed approach.

Keywords. Krylov subspace solver, block triangular preconditioner, primal-dual active set method, semismooth Newton method, Schur complement approximation.

References

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