

Accelerated Additive Schwarz Methods for Convex Optimization

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ABSTRACT

Based on an observation that additive Schwarz methods for general convex optimization can be interpreted as gradient methods [3], we propose an acceleration scheme for additive Schwarz methods. Adopting acceleration techniques developed for gradient methods such as momentum and adaptive restarting [1,2], the convergence rate of additive Schwarz methods is greatly improved. The proposed acceleration scheme does not require any a priori information on the levels of smoothness and sharpness of a target energy functional, so that it can be applied to various convex optimization problems. Numerical results for linear elliptic problems, nonlinear elliptic problems, nonsmooth problems, and nonsharp problems are provided to highlight the superiority and the broad applicability of the proposed scheme.

REFERENCES

1. Beck, A. and Teboulle, M. “A fast iterative shrinkage-thresholding algorithm for linear inverse problems”, *SIAM Journal on Imaging Sciences*, Vol 2, 2008, pp. 183–202.
2. O’Donoghue, B. and Candes, E., “Adaptive restart for accelerated gradient schemes”, *Foundations of Computational Mathematics*, Vol. 15, 2015, pp. 715–732.
3. Park, J., “Additive Schwarz methods for convex optimization as gradient methods”, *SIAM Journal on Numerical Analysis*, Vol. 58, 2020, pp. 1495–1530.