

Performance of the AMG Solvers in Solving Linear Systems Based on *H_p*-FEM

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Abstract

Comparison of open-source libraries for solving systems of algebraic equations is carried out. Attention is paid mainly to solvers (and/or preconditioners) using the method called algebraic multigrid. For testing, several direct and iterative solvers were chosen, such as MUMPS, UMFPACK, TRILINOS, PARALUTION and PETSc. Properties of these packages are illustrated on two examples whose results are discussed.

References

1. M. GEE AND C. SIEFERT AND J. HU AND R. TUMINARO AND M. SALA. “ML 5.0 smoothed aggregation user’s guide”. Sandia National Laboratories, Tech. Rep. SAND2006-2649, 2006.
2. S. BALAY AND ET AL.. “PETSc Web page”. <http://www.mcs.anl.gov/petsc>, 2015. [Online].
3. S. BALAY AND W. D. GROPP AND L. C. MCINNES AND B. F. SMITH. “Efficient management of parallelism in object oriented numerical software libraries”. in *Modern Software Tools in Scientific Computing*, E. Arge, A. M. Bruaset, and H. P. Langtangen, Eds. Birkhäuser Press, 1997, pp. 163–202.
4. R. D. FALGOUT. “An Algebraic Multigrid Tutorial IMA Tutorial – Fast Solution Techniques”. Lawrence Livermore National Laboratory, November 28 - 29, 2010.
5. A. H. BAKER AND AT AL.. “Scaling Algebraic Multigrid Solvers: On the Road to Exascale”. in *Competence in High Performance Computing 2010*, G. Wittum (ed.), Springer Science & Business Media, 2012, pp. 215–226, ISBN 3642240259.
6. O. G. ERNST AND M. J. GANDER. “Why it is Difficult to Solve Helmholtz Problems with Classical Iterative Methods”. in *Numerical Analysis of Multiscale Problems*, Springer Science & Business Media, 2012, pp. 325–363, DOI 10.1007/978-3-642-22061-6_10.