

PARALLEL SOLUTION OF THERMOELASTICITY PROBLEMS USING AGGREGATIONS

Roman Kohut

*Institute of Geonics, Czech Academy of Sciences,
CZ-708 00 Ostrava-Poruba, Czech Republic,
e-mail: kohut@ugc.cas.cz*

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Abstract

The contribution concerns the FE solution of the thermoelasticity problem. The numerical solution of this problem leads to the repeated solution of large systems of linear equations. For the solution of the system we use preconditioned CG method with overlapping Schwarz type preconditioners. If the Schwarz method is used for elliptic problems, the efficiency of the preconditioner decreases with increasing number of subproblems and for avoiding this problem it is necessary to involve coarse mesh correction. We use the algebraic coarse space created by aggregation. For the parabolic problem the corresponding system matrix depends on the time stepsize. In this case even one level Schwarz methods is efficient for suitable small stepsizes. The numerical tests are realised on a large geotechnical problem arising from the assessment of nuclear waste repositories.

References

- [1] R. Blaheta. Algebraic Multilevel Methods with Aggregations: An Overview, In: I. Lirkov, S. Margenov, J. Wasniewski (Eds.) LSSC 2005, LNCS 3743, Springer, Berlin, Heidelberg 2006, pp. 3-14, 2006.
- [2] J. Starý, R. Blaheta, O. Jakl, R. Kohut. Parallel Simulation of T/M Processes in Underground Repository of Spent Nuclear Fuel, Recent Advances in Parallel Virtual Machine and Message Passing Interface. 13.th European PVM/MPI User's Group Meeting Bonn, Germany, September 17-20, 2006 proceedings. Berlin: Springer, 2006 - (Mohr, B.), pp. 391-399, 2006

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