PARALLEL TWO-LEVEL SOLUTION OF THERMOELASTICITY PROBLEMS

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The contribution is devoted to the FE solution of the thermoelasticity problems. The problem is not fully coupled and can be divided into two parts. Firstly, the temperature distribution is determined by the solution of the nonstationary heat equation, secondly, at given time levels the linear elasticity problem is solved. The numerical solution of both problems 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 aggrregation. For the parabolic problem the corresponding system matrix depends on the time stepsize. In this case even one level Schwarz methods is efficiet for suitable small stepsizes.

The numerical tests were realised on a large geotechnical problem arising from the assessment of nuclear waste repositories. The parallel computations were performed on the Sun Fire 15000 computer at the Uppsala University. The symmetric multiprocessor consists of 36 UltraSPARC III processors.