Parallel BEM-based methods

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In the talk three parallel methods based on fast boundary elements are presented. We start with an introduction to the boundary element method for linear PDEs accelerated by adaptive cross approximation, which is straightforward to implement efficiently in parallel. Next, we discuss two nonoverlapping domain decomposition techniques. The first one is based on solutions to local Dirichlet problems and a successive correction on the skeleton. This is the method due to Bramble, Pasciak, and Schatz published in 1986, called BPS. Finally, we discuss the domain decomposition with Lagrange multipliers, introduced by Farhat and Rough in 1991, the BEM counterpart of which is called BETI, see Langer and Steinbach 2003. While in case of linear problems BETI with the so called Dirichlet preconditioner is almost a kind of BPS, in case of multi-body contact problems in mechanics the advantage of dual formulation of BETI is significant, since linearized nonpenetration constraints translate to simple bounds, for which optimal quadratic algorithms developed at our department by Dostal and collaborators are available.