Implementation of the Gluing Constraints Within the FETI Domain Decomposition Methods

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Abstract

This paper deals with parallel implementation of the constraint matrix B which is a crucial part of the FETI non-overlapping domain decomposition method. This matrix manages connectivity between subdomains, and may also accomplish Dirichlet conditions and other equality constraints.

Our particular implementation is a part of our new software toolbox PERMON. It makes use of results in quadratic programming algorithms and domain decomposition methods. It is built on top of the PETSc framework for numerical computations.

We would like to present the basic implementation idea of efficient assembly and storage of the constraint matrix. We use several useful PETSc features concerning matrix distribution, nested matrices and PetscSF communication routines using star forest graphs. The part of the matrix B managing connectivity between subdomains is computed just from a user-provided mapping between local and global numberings of degrees of freedom on subdomain interfaces.

References

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