

HIERARCHICAL SUBSTRUCTURING AND PARALLEL MESH GENERATION OF HETEROGENEOUS STRUCTURES FOR DOMAIN DECOMPOSITION METHODS

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The method presented here is a parallel mesh generation method leading to subdomains well-suited to Schur based domain decomposition solvers such as the FETI and BDD methods. Starting from a coarse mesh, subdomains meshes are created in parallel through hierarchical mesh refinements and mesh deformations techniques. The proposed methodology aims at limiting the occurrence of known pathological situations [2] (jagged interfaces, misplaced heterogeneity with respect to the interfaces, . . .) that penalize the convergence of the solver. Some cures were developed earlier for these situations [2, 1] but they require important additional computational resources. The goal, here, is to reach the solution without the help of these expensive methodologies, while making parallel the usually expensive steps dealing with mesh generation and splitting. The method is assessed, on several academical and industrial test cases, for both its parallel efficiency when creating the mesh and its capability to generate decomposition resulting in less FETI iterations (see Figure 1 for an application on a simplified geometry of a blade).

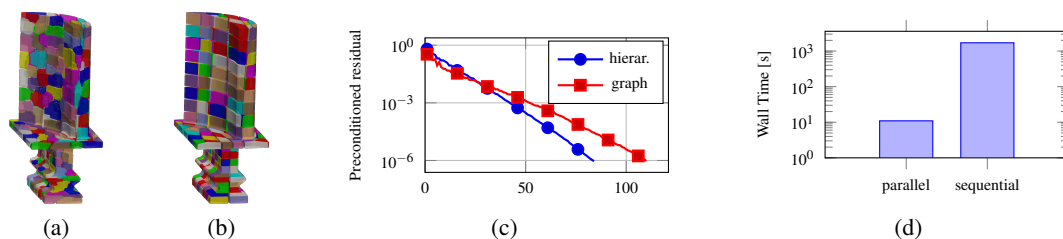


Figure 1: Comparison between graph-based decomposition (a) and hierarchical decomposition (b) in terms of FETI convergence history (c) and time of parallel vs sequential meshing and partitioning (d)

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