Parallel Strategy for High Performance Isogeometric Analysis using Bézier Deomposition Method

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ABSTRACT

Isogeometric Analysis (IGA) employs a geometry-based data structure, which considerably simplifies the mesh generation procedure due to a parameterization of the geometry directly used in the analysis. Together with the flexible hpk-refinement capability, isogeometric method provides a promising tool for large-scale simulations. In this contribution, the parallelism of the isogeometric method is enhanced by using the Bézier decomposition method. The idea is to decompose the NURBS control mesh into Bézier elements of local form, thereby retaining the standard finite element data structure. The hybrid parallel approach is then used to assemble the global stiffness matrix. In this sense, the mesh partitioning algorithm employing Message Passing Interface (MPI) is used to decompose the Bézier element mesh. For the solution of the resulting linear system several (combinations of) linear solvers will be investigated, using the objected oriented framework provided by the software KRATOS. Respective results from benchmark analyses will be presented.

K**eywords:**

NURBS, Isogeometric analysis, Bézier decomposition, High performance computing, Mesh partitioning, MPI.

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