The 8th European Congress on Computational Methods in Applied Sciences and Engineering
ECCOMAS Congress 2022
5-9 June 2022, Oslo, Norway

# An isogeometric solver for tensor-product multi-patch geometries

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**Keywords**: *Isogeometric Analysis, Preconditioners, Domain Decomposition methods*

In this talk we present a solver for elliptic problems discretized with the isogeometric approch on a multi-patch geometry, obtained by combining a domain decomposition approach with an efficient inexact solver for the local problems. Our starting point is the All-Floating-FETI method (AF-FETI), a variant of the classical FETI method where both the continuity of the solution through the patches and Dirichlet boundary conditions are weakly imposed by introducing a set of Lagrange multipliers [3]. The interface is dened as the union of all local boundaries, thus endowing all local problems with a full tensor product structure. In our approach, which in the spirit of [2], is named All Floating-IsogEometric Tearing and Interconnecting (AF-IETI) method, we introduce a saddle point formulation that allows to employ inexact solvers for the local problems [1]. These problems are possibly large, but they can be efficiently tackled with an inexact solver based on the Fast Diagonalization (FD) method. FD method has already been employed in an efficient preconditioner for the local problems of an overlapping Schwarz method in [4]. In AF-IETI the local problems always have the required tensor structure, even if a face of the patch is not wholly associated with a single kind of boundary condition, or it does not wholly touch the boundary of other patches. To show the potential of our approach, we compare numerically the performance of AF-IETI coupled with the inexact FD-based preconditioner with the exact preconditioner. Our results indicate that the inexact approach requires orders of magnitude less time than the exact one. Moreover, its performance does not deteriorate as the degree $p$ is increased.

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