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MESH GENERATION FOR ISOGEOMETRIC ANALYSIS WITH T-SPLINES

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Abstract.

The application of the Isogeometric Analysis (IA) with T-splines [1] demands a partition of the parametric space, C, in a tiling containing T-junctions denominated T-mesh. The T-splines are used both for the geometric modelization of the physical domain, D, and the basis of the numerical approximation. They have the advantage over the NURBS of allowing local refinement.

In this work we propose a procedure to construct T-spline representations of complex domains in order to be applied to the resolution of elliptic PDE with IA. In precedent works [2, 3] we accomplished this task by using a tetrahedral parametrization. In the present approach, the T-mesh is mapped, without the help of the tetrahedral parametrization, to the physical domain by using a refinement and optimization technique based on similar ideas than the ones presented in the meccano method for tetrahedral meshes [4].

The T-mesh is generated by partitioning C with a balanced quadtree (a octree in 3D), where the grade of refinement of the partition must be enough to capture, with the desired precision, the irregularities of D. The vertices of the T-mesh are replaced in optimal positions in D, and then, we calculate the control points of D by imposing interpolation conditions.

Several examples of the application of the meshes generated by this procedure to IA will be presented.

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