

Construction of AS T-splines through local higher-dimensional representations

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In 2003, T-splines were introduced in the context of CAD as a new realization for B-splines on irregular meshes that does not require the bookkeeping of a hierarchical basis, but nevertheless allows for local mesh refinement in order to control small-scale geometry features. Shortly after, IGA was introduced, and T-splines were applied with promising results, however an appropriate local refinement strategy needed to be investigated. The main issues have been solved for 2D meshes until 2013, but spline-based discretizations and appropriate local refinement strategies for unstructured 2D and 3D meshes are still subject of ongoing research.

We propose a construction of analysis-suitable T-splines for unstructured two-dimensional T-meshes. This construction makes locally use of higher-dimensional meshes of which the given unstructured mesh is a lower-dimensional projection. According to this construction, we use key ideas from the local refinement of higher-dimensional structured meshes to develop a local refinement strategy for the 2D unstructured case. Finally, we sketch ideas and ongoing work towards a theoretical rate-optimality of the h -adaptive IGA for a second-order elliptic PDE.

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