

A Quasi-interpolation Method Based on LR B-splines

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ABSTRACT

In order to break down the tensor structure of standard B-splines, Locally Refinable (LR) B-splines have been introduced in [1] by extending the concept of knot insertion of the 1D B-splines to local insertion of $(d-1)$ -dimensional boxes for the dD case. Like standard tensor-product B-splines, LR B-splines have local supports, are nonnegative and, using weights in $(0,1)$, they form a partition of unity. However, a full description of their linear independence is still an open problem.

LR B-splines are defined over mesh instances, called LR-meshes. These are built as a sequence of local insertions starting from a coarse tensor mesh. In [2] there is provided a way of generating LR-meshes over which the corresponding LR B-splines are locally linearly independent. These meshes have a hierarchical structure, and the procedure requires an a priori knowledge of the subregions of the domain where the mesh should be finer.

On the other hand, a quick and light construction of quasi-interpolation schemes based on Truncated Hierarchical (TH) B-splines has been developed in [3]. It is actually also applicable in the general setting where the basis functions have local supports, are nonnegative, form a partition of unity and are locally linearly independent. Moreover, it is proved that such a quasi-interpolant is actually a projector on the space spanned by the basis functions under some not-so-restrictive hypotheses on the given data set.

In this talk we combine the above results to get a quasi-interpolant based on LR B-splines. We provide some numerical examples, and make comparisons with THB-splines and tensor-product B-splines.

REFERENCES

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