Isogeometric Analysis based on Box splines

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In the context of Isogeometric Analysis (IgA) and in the numerical treatment of PDE's in general, efficient local refinement procedures and an easy modeling of complex geometries are crucial ingredients, see [1].

The tensor-product approach, based on NURBS and their generalization, is not suitable for efficient local refinements, due to its inherent rectangular topology and it makes the modeling of "non rectangular" regions a hard task.

On the other hand, splines over triangulations offer both the possibilities of efficient local refinements and easy modeling of complex geometries, see [2]-[3], but dealing with completely general triangulations is quite difficult.

Splines on regular triangulations equipped with suitable bases, are the natural bivariate generalization of univariate B-splines, can be extended to higher dimensions and therefore, they can provide an interesting alternative to NURBS in IgA.

In this talk we report about our ongoing work concerning the use of bivariate Box splines defined on regular three-directional meshes in IgA.

References

[1] Cottrell J.A., T.J.R. Hughes and Y. Bazilevs: Isogeometric Analysis: Toward Integration of CAD and FEA, John Wiley & Sons (2009).

[2] Jaxon N. and X. Qian: Isogeometric analysis on triangulations, *CAD* **46** (2014), 45–57.

[3] Speleers H., C. Manni, F. Pelosi and M.L. Sampoli: Isogeometric analysis with Powell-Sabin splines for advection-diffusion-reaction problems, *Comput. Methods Appl. Mech. Engrg.* **221–222** (2012), 132–148.