Semi-structured curves and surfaces

Xin Li[1], and T W Sederberg[2]

[1] USTC, China,E-mail lisustc@ustc.edu.cn
[2] Department of Computer Science, BYU, E-mail michael.scott@byu.edu

Key Words: *T-splines, Local refinement, iso-geometric analysis*

T-splines have been proved to be a powerful technology both in computer aided geometric design and isogeometric analysis. However, T-splines[1,2] suffer two main disadvantages, i.e., lack of proof of linear independence of the associated blending functions and the global propagation of local refinement algorithm. Analysis-suitable T-splines[3,4] form a practically useful subset of T-splines[1,2] which give an answer for the first question. They maintain the design flexibility of T-splines, while preserving the important analysis-suitable mathematical properties of the NURBS basis. The present talk introduces semi-structured spline curves and surfaces. Local refinement of semi-structured spline surfaces is relatively simple, and no additional, unrequested control points need to be added as is the case in T-spline refinement. The refinement algorithm assures linear independence of the blending functions when non-multiple knots are inserted. Thus, when applied to isogeometric analysis, semi-structured spline surfaces provide minimal degrees of freedom during adaptive local refinement.

REFERENCES

[1] T. W. Sederberg, J. Zheng, A. Bakenov, A. Nasri, T-splines and T-NURCCs, ACM Trans. Graph. 22 (2003) 477-484.
[2] T. W. Sederberg, D. L. Cardon, G. T. Finnigan, N. S. North, J. Zheng, T. Lyche, T-spline simplification and local re_nement, ACM Trans. Graph. 23 (2004) 276-283.
[3] X. Li, J. Zheng, T. W. Sederberg, T. J. R. Hughes, M. A. Scott, On linear independence of T-spline blending functions, Computer Aided Geometric Design 29 (2012) 63- 76.
[4] M. A. Scott, X. Li, T. W. Sederberg, T. J. R. Hughes, Local re_nement of analysis-suitable Tsplines, Computer Methods in Applied Mechanics and Engineering 213 (2012) 206- 222.