

GENERALIZED T-SPLINES AND T-MESHES GUARANTEEING THEIR LINEAR INDEPENDENCE

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ABSTRACT. The T-spline functions, first introduced in [6] and in [7], are nowadays a relevant tool in isogeometric analysis (see, e.g., [1, 2]). The use of T-splines gives some considerable improvements on the classical tensor-product splines and NURBS, such as the possibility to apply local refinements, a heavy reduction of the number of control points needed, and the ability to easily avoid gaps when joining several surfaces.

The T-spline approach is mainly applied to polynomial splines, but in some situation the use of non-polynomial splines gives noteworthy advantages: for example, exactly reproducing some relevant shapes (such as cycloids and helices) which can only be approximated by using polynomial splines requires the use of non-polynomial splines (see, e.g., [5]). For this reason, we propose the extension of the T-spline framework to the generalized B-splines (see [5] for details), which are locally spanned both by polynomial and non-polynomial functions. This leads to the new concept of Generalized T-splines (see [3] for our results about the trigonometric case).

In this talk, we will analyze the main properties of the Generalized T-splines [4]; in particular we will study their linear independence, which is a key point to be able to use them in the isogeometric framework. This study will allow us to define a class of T-meshes which guarantee the linear independence both of Generalized T-splines and of classical T-splines of the same bi-order associated to the same T-mesh; moreover, we will show that this class of T-meshes properly includes the well-known analysis-suitable (equivalently, dual-compatible [8, 9]) T-meshes.

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