Isogeometric Interpolation by Generalized Splines

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Abstract. It is well known that polynomial splines generally do not retain the geometric properties of the given data. This paper defines a class of functions $I(V)$ having shape properties ("isogeometry") determined by a given set of points $V = \{P_i = (x_i, f_i) \in R^2 : x_0 < x_1 < \cdots < x_N\}$. Based on the definition, necessary and sufficient inequality conditions on V are given in order that $I(V)$ be non-empty. A local algorithm for convex and monotone interpolation by C^2 generalized splines is obtained. Its application enables us to give a complete solution to the isogeometric interpolation problem for data of arbitrary form, and to isolate the sections of linearity, the angles and the breaks.