Optimized design of Bézier surface through Bézier geodesic quadrilateral.

Summary: This paper studies constructing polynomial Bézier surface that interpolates a Bézier curvilinear quadrilateral as boundary geodesics. The construction consists of two parts. First, from the given corner data (i.e., position, tangent and curvature at the corner of each curve), four quintic Bézier curvilinear quadrilateral with minimum strain energy is constructed to satisfy the constraints of the crossing geodesics on a surface. Second, a polynomial Bézier surface of degree (7, 7) is constructed to interpolate the quadrilateral as boundary geodesics of the constructed surface. We identify the precise degrees of freedom in terms of the control points. And the constructed surface that adheres to the NURBS standard and employs geometric shape handles can be readily incorporated into commercial CAD systems. The method is illustrated by several computational examples.

Keywords: Bézier surface; interpolation; geodesic quadrilateral; optimized design
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