Bezier curves and surfaces based on modified bernstein polynomials

ABSTRACT

In this paper, B´ezier curves and surfaces have been constructed based on modified Bernstein bases functions with shifted knots for $t \in \alpha n+\beta, n+\alpha n+\beta$. Various properties of these modified Bernstein bases are studied. A de Casteljau type algorithm has been developed to compute B´ezier curves and surfaces with shifted knots. Furthermore, some fundamental properties of B´ezier curves and surfaces with modified Bernstein bases are also discussed. Introduction of parameters α and β enable us to shift Bernstein bases functions over subintervals of [0, 1]. These new curves have some properties similar to classical B´ezier curves. We get B´ezier curves defined on [0, 1] when we set the parameters α, β to the value 0. Simulation study is performed through MATLAB R2010a. It has been concluded that B´ezier curves that are generated over any subinterval of [0, 1] based on modified Bernstein bases functions are similar to the B´ezier curves that are generated based on classical Bernstein bases functions over the interval [0, 1].

Keyword: Degree elevation; Degree reduction; de Casteljau algorithm; Bernstein blending functions with shifted knots; B´ezier curve; Tensor product; Shape preserving