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Modification of the Curve and the Surface Polynomial Bezier Using de Casteljau Algorithm

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ABSTRACT

Research carried out to obtain a Bezier curve of degree six resulting curvature of the curve is more varied and multifaceted. Stages in formulating applications Bezier surfaces revolution in design, there are three marble objects. First, calculate the parametric representation revolution Bezier surface and shape modification in a number of different forms. Second, formulate Bezier parametric surfaces that are continuously incorporated. Lastly, apply the formula to the design objects using computer simulation. Results marble obtained are Bezier curves of degree six modified version of the Bezier curve of degree five and some form of revolution Bezier surfaces are varied and multifaceted.

Keywords: Revolution Bezier surfaces, Modeling, Continuity and modification form

INTRODUCTION

Model development of creative industries is like a building that would strengthen economic development, with the foundation, pillars and roofs as elements of the building. In practice, the fabrication process industry craft objects, such as industrial ceramic or marble handicrafts requires treatment stages in shaping it. First, establish the model to be constructed. Second, convert the raw materials into semi-finished goods, thirdly, to form semi-finished goods into goods more refined, last, smoothing the surface of objects, but with the continuously growing number of creative industry such, it resulted in the marketability and price of items manufactured in domestic or export markets is waning. Primarily problems are generally the products they produce the pattern still remains, has not been matched by an increase in artistic quality and diversification/innovation shapes required by customers both from the level of symmetry, harmony, and variations of the model as well as from the aspect of different types of goods. Design and fabrication of objects of industrial output is still done manually. How to design the shape of the object before it was fabricated, mostly done by duplicating the object already. These issues, this article is intended to get technique count and parametric formula of Bezier curves of degree six that will be used as the basic component of the play character crafts industry. Formula natural shape already covered by Faux [1] and Kusno [2], The study continuous merger of two pieces of Bezier curves and surfaces have been covered by Zheng[3], Merging Bezier curves with geometric objects developed by Juhari [4] by adopting the theories of geometry transformation [5], Application development order polynomial Bezier curve has been done previously during the Bezier curve of order five modified version of the Bezier curve cuartik[6], In this paper, further developed rotary defining Bezier surfaces which will be equipped with the basic shape of the surface modifier parameters. Furthermore, the merger will be calculated continuous parametric Bezier surfaces rotate as well as some form of revolution

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Bezier surfaces are varied and multifaceted.

METHODS

Stages in formulating applications Bezier surfaces revolution in design, there are three marble objects. First, calculate the parametric representation revolution Bezier surfaces and modified forms in several different forms. Second, formulate Bezier parametric surfaces that are continuously incorporated. Lastly, apply the formula on a marble design objects using computer simulations.

RESULTS AND DISCUSSION

The general formula Bezier curve of degree n defined in terms of

$$C_n(u) = \sum_{i=0}^{n} P_i B_i^n(u)$$

with and $B_i^n(u) = \binom{n}{i}(1-u)^{n-i}.u^i 0 \le u \le 1$

The Formula Bezier Five Order

$$p(u) = a + bu + cu^2 + du^3 + eu^4 + fu^5$$

Interpolation point is the first point and the sixth, while the second point to the fifth point is the point approximation. Thus, for the i-th segment that forms the control points $P1$, $P2$, $P3$, $P4$, $P5$, $P6$ is defined as follows:

$$V(0) = P_0$$

$$V(1) = P_5$$

$$V'(0) = 5(P_1 - P_0)$$

$$V'(1) = 5(P_5 - P_4)$$

$$V''(0) = 20(P_0 - 2P_1 + P_2)$$

$$V''(1) = 20(P_3 - 2P_4 + P_5),$$

M_{MH}a matrix resulting the Hermit curve of degree five. So Bezier curve of degree five in parametric form, namely:

$$\begin{aligned} V(u) = {} & P_0(1 - 5u + 10u^2 - 10u^3 + 5u^4 - u^5) + P_1(5u - 20u^2 + 30u^3 - 20u^4 + 5u^5) \\ & + P_2(10u^2 - 30u^3 + 30u^4 - 10u^5) + P_3(10u^3 - 20u^4 + 10u^5) \\ & + P_4(10u^3 - 15u^4 + 5u^5) + P_5(u^5) \end{aligned}$$

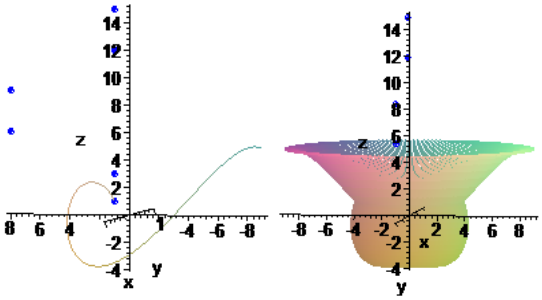

Figure 1. Bezier curve of degree Lima

Modification a Curve Bezier Order five to Six Order

Suppose a Bezier curve of degree five is expressed in the form

$$C_5(u) = \sum_{i=0}^{5} P_i B_i^5(u)$$

with. Bezier polygon with a point of view of control is defined as follows,$0 \leq u \leq 1[P_0, P_1, P_2, P_3, P_4, P_5]W_{51}, W_{52}, W_{53}, W_{54}, W_{55}$

$W_{51} = \lambda_{51}P_1 + (1 - \lambda_{51})P_0$

$W_{52} = \lambda_{52}P_2 + (1 - \lambda_{52})P_1$

$W_{53} = \lambda_{53}P_3 + (1 - \lambda_{53})P_2$

$W_{54} = \lambda_{54}P_4 + (1 - \lambda_{54})P_3$

$W_{55} = \lambda_{55}P_5 + (1 - \lambda_{55})P_4$

With $0 \leq \lambda_{51}, \lambda_{52}, \lambda_{53}, \lambda_{54}, \lambda_{55} \leq 1$ and $\lambda_{51}, \lambda_{52}, \lambda_{53}, \lambda_{54}, \lambda_{55}$

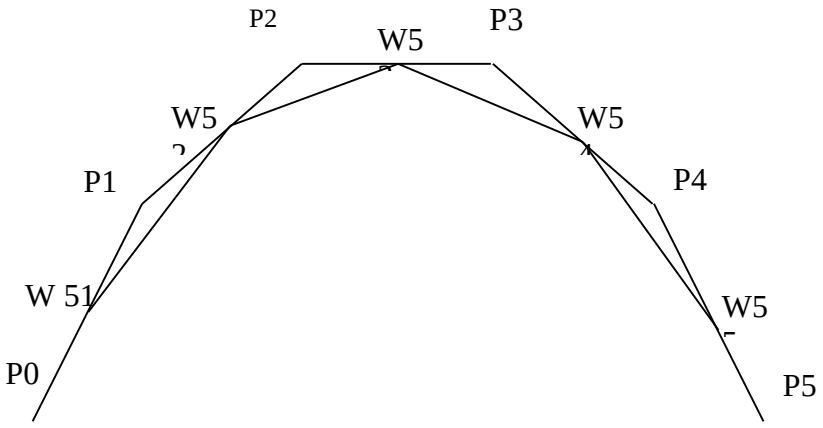

Figure 2. Modification of the Bezier Curve Bezier curves of degree five Become a degree Six

With the control points the new polygon $\Omega = [P_0, W_{51}, W_{52}, W_{53}, W_{54}, W_{55}, P_5]$ on the model of bezier curve of degree five $C_5(u)$ could be modified into a Bezier curve of degree six $C_6(u)$ with polygon control points Ω in the following,

Suppose a Bezier curve of degree six expressed in the form

$$C_6(u) = \sum_{i=0}^{6} P_i B_i^6(u)$$

with $B_i^6(u) = \binom{6}{i}(1-u)^{6-i}.u^i$ and $0 \leq u \leq 1$, then the six-degree Bezier curves results in the form of parametric modifications are:

$$\begin{aligned} V(u) = P_0(u^6 - 6u^5 + 15u^4 - 20u^3 + 15u^2 - 6u + 1) \\ + W_{51}(-6u^6 + 30u^5 - 60u^4 + 60u^3 - 30u^2 + 6u) \\ + W_{52}(15u^6 - 60u^5 + 90u^4 - 60u^3 + 15u^2) \\ + P_3(-20u^6 + 60u^5 - 60u^4 + 20u^3) + P_4(15u^6 - 30u^5 + 15u^4) \\ + W_{55}(-6u^6 + 6u^5) + P_5(u^6) \end{aligned}$$

With $0 \leq u \leq 1$. The following are examples with kuartik bezier curve with control points $P_0 = (1,0,1), P_1 = (1,0,3), P_2 = (8,0,6), P_3 = (8,0,9), P_4 = (1,0,12), P_5 = (1,0,15)$. the example $\lambda = [0.1,0.1,0.1,0.1,0.1]$

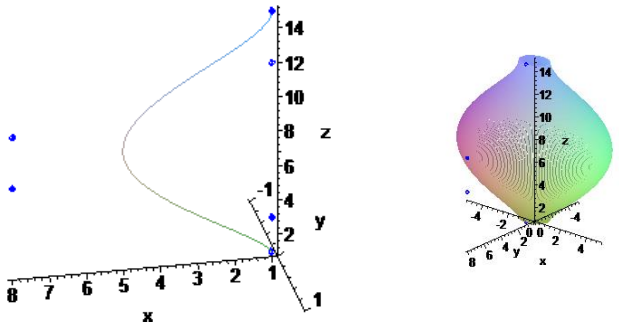

Figure 3 Bezier curve of degree five Modifications Become Bezier curve of degree six

CONCLUSION

The introduction of parameters shapeshifters swivel base Bezier surface can produce a variety of new forms of rotary Bezier surfaces. So the impact on the creation of models of industrial objects easier, more varied, and multifaceted. The forms of the rotary Bezier surface of degree six results from the modification of Bezier curves berdrajat five with some data selection control points P_0, P_1, P_2, P_3, P_4 and P_5 a new control point $W_{51}, W_{52}, W_{53}, W_{54}$ and being influenced by the administration of parameter values $\lambda_{51}, \lambda_{52}, \lambda_{53}, \lambda_{54}, \lambda_{55}$ present different results. The steps undertaken to construct a marble craft is to determine the height and radius of the object. So it can be used to model the other objects ceramics industry.

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