REPRESENTATION OF THE CURVE BY ITS TANGENTIAL MAPS ON THE SIDE OF THE SIMPLEX

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Summary. In the article is examined the method of task of arbitrary curve through its tangential reflections on parties of local simplex in terms of point calculation of Baluby-Naidysha.

Keywords: **the point calculation of Baluby-Naydisha (BN-calculation), tangential reflection, tangent, local simplex, derivative of curve.**

The r***aising of problem.*** Task of finding of tangential reflections a curve on parties of simplex, where a curve is determined (crossing of tangent to the curve with the axes of the in-plant system of coordinates), is important enough and poorly worked out on the way of research of properties of flat curves in point presentation. In multidimensional space curves are set, as a rule, by the separate parameters of position and parameters of form. To the first it is possible to take a local simplex, to the second is an algorithm of construction and function of form. Division of these parameters at constructing of geometrical forms, phenomena or processes plays a considerable role for the process of creation of object.

Analysis of the last researches and publications. Research of questions of tangential reflections of curve was engaged Adler B.A. in his labors on discrete differential geometry [1]. In particular, tangential reflection it was certain his determination as a local reflection on the great number of flat curves.

In a point BN-calculation, the question of construction of tangential reflections was not examined, but tasks near to this subjects were examined in works of Davydenko I.P. [2,3]. In particular, them was given the concept of derivative of curve, the usage of that it is not impossible to avoid at the construction of tangential reflections, but a certain concept of tangential reflection was not brought.

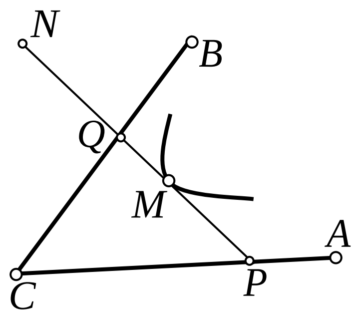

Fig.1. The reflection of intersection on the side of simplex

Forming of aims of the article. To work out the algorithm of construction of curve, by means of its tangential reflections on parties of local simplex.

Main body. The tangential reflections it is necessary to understand intersections PQ by the curve M of tangent with parties of local simplex CAB (pic.1) a curve is certain in that.

Let a line PQ is set in a local simplex CAB:

$$P = (A - C)\overline{u} + C; \qquad (1)$$

$$Q = (B - C)v + C; \qquad (2)$$

Parameters υ and υ in equalizations (1) and (2) it is possible to define as follows:

$$u = \frac{AP}{AC}; 1 - u = \overline{u} = \frac{PC}{AC}; v = \frac{CQ}{CB}.$$

Let fix on the curve PQ the point M with the help of parameter

$$w = \frac{PM}{PQ}.$$

Then, during the movement of the points P and Q on the sides of simplex and point M on the straight PQ we get a curve, which could be determined by equation:

$$M = P\overline{w} + Qw. \qquad (3)$$

After the substitution (1) and (2) in the resulting equation (3), it looks like this:

$$M = (A - C)\overline{uw} + (B - C)vw + C. \qquad (4)$$

Now we should determine the parameter *w* with the condition, that the line *PQ* is the tangent of the curve *M*. For determination of the tangent of the curve *MN* at the current point we should use the equation, given in the present research [2]:

$$N = M + \dot{M}. \qquad (5)$$

Let find the derivative of the curve $\dot{M}$, differentiating (4) by parameters u,υ and *v*

$$\dot{M} = -(A - C)\dot{u}\overline{w} - (A - C)\overline{u}\dot{w} + (B - C)\dot{v}w + (B - C)v\dot{w} = \\ = -(A - C)(\dot{u}w + \overline{u}\dot{w}) + (B - C)(\dot{v}w + v\dot{w}). \qquad (6)$$

Get the equation of the tangent of the curve at the current point, substituting (4) and (6) in (5):

$$N = (A - C)\overline{uw} + (B - C)vw + C - (A - C)(\dot{u}w + \overline{u}\dot{w}) + \\ +(B - C)(\dot{v}w + v\dot{w}) = (A - C)(\overline{uw} - \dot{u}w - \overline{u}\dot{w}) + \\ +(B - C)(vw + \dot{v}w + v\dot{w}) + C. \qquad (7)$$

The point *M* belongs to a straight *PQ*, which is tangent of the curve. The point *N* is the current tangent point and, therefore, belongs to the direct *PQ*. At this case the square of triangle *PQN* should be equal to 0. For determination of the square of triangle we should make the determinant of the parameters of the relevant points:

$$S=\begin{vmatrix}\overline{uw}-\dot{u}w-\overline{u}\dot{w} & vw+\dot{v}w+v\dot{w} & 1\\ \overline{u} & 0 & 1\\ 0 & v & 1\end{vmatrix}=0.$$

From the got equalization we let find a parameter *w*:

$$\begin{gathered}\overline{u}v-(vw+\dot{v}w+v\dot{w})\overline{u}-(\overline{uw}-\dot{u}w-\overline{u}\dot{w})v=0\rightarrow\\ \rightarrow\overline{w}(\dot{u}v-\overline{u}v)-w(\overline{u}v+\overline{u}\dot{v})+\overline{u}v=0\rightarrow\\ \rightarrow\dot{u}v-\overline{u}v-w(\dot{u}v-\overline{u}v+\overline{u}v+\overline{u}\dot{v})+\overline{u}v=0\rightarrow\\ \rightarrow w=\frac{\dot{u}v}{\dot{u}v+\overline{u}\dot{v}}.\end{gathered}\tag{8}$$

Putting (8) in (4), we will get the equalization of curve M, set by its tangential reflections *P* and *Q*:

$$M=(A-C)\frac{\overline{u}^2\dot{v}}{\dot{u}v+\overline{u}\dot{v}}+(B-C)\frac{\dot{u}v^2}{\dot{u}v+\overline{u}\dot{v}}+\mathrm{C}.\tag{9}$$

Conclusions. In the present research was suggested the algorithm of construction of curve through its tangential reflections on parties of local simplex, where it is set, that will allow to us to pass consideration of spatial simplex and tangential reflections on his verge. Also, this task extends a tool of point BN-calculation, because researches in this direction were not yet conducted.

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