SWEEP OF SURFACES IN GALILEAN SPACE

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Galilean space R_3^1 is a three-dimensional affine space with a degenerate metric [1].

The basic geometric elements of a straight line, plane, and parallelism in Galilean space do not differ from these concepts of Euclidean space. Significantly different spatial motions of these spaces, that is, the transformation of space that preserves the distance between points.

Under the sweep of surface we mean a uniquely mapping of pieces of the surface at which the distance between the points and the angle between the lines are preserved. It is allowed to cut the surface into pieces and indicate the gluing methods [2].

B.M. Sultanov studied the sweep of surfaces consisting only of parabolic points [3]. These are cylinders and cones. It is shown that parabolic points of the surface are divided into two classes: parabolic and special parabolic.

It is proved that they have a different sweep on the plane. An example is given of cylinders equal in Euclidean space, but in the Galilean space one of them is a parabolic surface, the other is special parabolic. Moreover, they have different sweeps on the plane.

In this article, a surface sweep is obtained that is uniquely projected onto a general position plane in Galilean space.

Definition 1. If between the points of the surface $F \subset R_3^1$ and the points of the domain G in the plane Oxy, there is an unambiguous mapping, the distance between the corresponding points have the same order and equal, then the domain G - sweep is called a surface F in the plane Oxy.

In Euclidean space has a sweep only convex polyhedral cylindrical surface, cone. The degeneracy of the Galilean space metric allows for the unfolding of surfaces of a wider class.

Theorem 2. *The surface $F \in R_3^1$ - width $[a, b]$ and uniquely projected on the Oxy plane, has a sweep G on the band $a \leq x \leq b$ of the Oxy plane.*

Let D be a domain on the plane in general position Oxy, and $D = \{(x, y) \in R_2^1 : a \leq x \leq b; \varphi_1(x) \leq y \leq \varphi_2(x)\}$, where $\varphi_1(x), \varphi_2(x)$ are continuous functions in $[a, b]$.

Consider a surface $F : z = f(x, y) \quad (x, y) \in D$ with a boundary uniquely projecting onto the boundary of the domain D.

Theorem 3. *The surface $F : z = f(x, y)$ is deployed to the area $G = \{(x, y) \in R_2^1 : a \leq x \leq b; 0 \leq y \leq \int_{\varphi_1}^{\varphi_2} \sqrt{1 + f_y^2(x, y)dy}\}$ on the plane Oxy.*

References

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