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НАМАНГАНСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ

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ABSTRACTS

OF THE CONFERENCE “NEW THEOREMS OF YOUNG MATHEMATICIANS-2022”

«YOSH MATEMATIKLARNING YANGI TEOREMALARI – 2022» ILMIY ANJUMAN

TEZISLARI TO‘PLAMI

ТЕЗИСЫ ДОКЛАДОВ

НАУЧНОЙ КОНФЕРЕНЦИИ «НОВЫЕ ТЕОРЕМЫ МОЛОДЫХ МАТЕМАТИКОВ – 2022»

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МУНДАРИЖА

1-ШЎЪБА. АЛГЕБРА, ФУНКЦИОНАЛ АНАЛИЗ, ГЕОМЕТРИЯ

$$\|x\|_p = (\tau(|x|^p))^{\frac{1}{p}},\ x \in L^p(M,\tau).$$

Рассмотрим множество $L^{\omega}(M,\tau) = \bigcap_{p\geq 1} L^p(M,\tau)$.

В работе [5] показано, что является полной локально выпуклой метризуемой $*$-алгеброй относительно топологии t, порожденной системой норм $\left\{\|\cdot\|_p\right\}_{p\geq 1}$.

Алгебра $L^{\omega}(M,\tau)$ называется *некоммутативной алгеброй Аренса*.

Следующая теорема известно из работы [6].

Теорема. *Если M – алгебра фон Неймана типа I, то всякий Z-линейный *-автоморфизм алгебры $L^{\omega}(M,\tau)$, является внутренним.*

Пусть M_3 – алгебра квадратных матриц третьего порядка над $L^{\omega}(M,\tau)$. Если отражение $\Phi: M_3 \to M_3$ определяется формулой

$$\Phi(X) = \begin{pmatrix} \phi(x_{11}) & \phi(x_{12}) & \phi(x_{13}) \\ \phi(x_{21}) & \phi(x_{22}) & \phi(x_{23}) \\ \phi(x_{31}) & \phi(x_{32}) & \phi(x_{33}) \end{pmatrix},\ X = \begin{pmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{pmatrix},\ x_{ij} \in L^{\omega}(M,\tau) \quad (1),$$

здес отображение $\phi: L^{\omega}(M,\tau) \to L^{\omega}(M,\tau)$ является Z-линейный *-автоморфизмом, то по приведенной выше теореме мы получаем следующий результат.

Результат. Если отображение $\Phi: M_3 \to M_3$ алгебры квадратичных матриц второго порядка над $L^{\omega}(M,\tau)$, определяется формулой (1), то оно имеет вид $\Phi(X) = AXA^*$, где $A = \begin{pmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{pmatrix}$.

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THEOREMS ON A SURFACE IN ISOTROPIC SPACE

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The isotropic space R_3^2 is a subspace of the Minkowski space ${}^1R_4$. Interest in the study of the geometry of isotropic space is explained by its application in classical mechanics and quantum theory. The geometry of surfaces of an isotropic space was first studied by K. Strubeker [6]. Recently, a number of papers have appeared on the differential geometry of an isotropic space, including the works by E.M. Aydin [3], M.S. Lone and M.K. Karacan [4], and H. Sachs [5].

Let there be given a three-dimensional affine space A_3, set by an affine coordinate system $Oxyz$.

Definition 1. *If the dot scalar product of vectors* $X\{x_1, y_1, z_1\}$ *and* $Y\{x_2, y_2, z_2\}$ *is given by the formula*

$$\begin{cases} (X,Y)_1 = x_1x_2 + y_1y_2 \quad \text{if} \quad (X,Y)_1 \neq 0 \\ (X,Y)_2 = z_1z_2 \quad \text{if} \quad (X,Y)_1 = 0 \end{cases}, \tag{1}$$

then the space is said to be an isotropic space and denoted by R_3^2 [2].

Since an isotropic space has an affine structure, there is an affine transformation that preserves the scalar product by formula (1). This motion of an isotropic space is given by the formula [5]

$$\begin{cases} x' = x\cos\varphi - y\sin\varphi + a \\ y' = x\sin\varphi + y\cos\varphi + b \\ z' = \alpha x + \beta y + z + c \end{cases}.$$

The theory of surfaces in isotropic space is given in the works of K. Strubecke. If a uniquely projected regular surface F is given by the equation $z = f(x, y),\ (x, y) \in D$,
the formulas for the total and mean curvature of the surface are further simplified and have the form

$$K = f_{xx} f_{yy} - f_{xy}^2, \quad 2H = f_{xx} + f_{yy},$$

respectively.

The right-hand side of total curvature equation is called the Monge-Ampère operator [].

As we know, in the case of $K = 0$, the surface can be a plane, a cylinder, a cone, or another developing surface. Let a surface F from the class C^2 be given, defined on the whole plane Oxy. The following theorem can be stated[1].

Theorem 1. *If the total curvature of a surface* F *is equal to zero, and the condition*

$$f_x'^2 f_{yy}'' + f_{xx}'' f_y'^2 - 2 f_x' f_y' f_{xy}'' = 0$$

holds, then the total curvature of the surfaces $\chi = \chi(f)$ *is also equal to zero, here* $\chi(f) \in C^2$ *is any function.*

Corollary. *The function* $f(x, y) = C_1x + C_2y + C$ *satisfies the condition of the theorem. This means that the functions* $\chi = \chi(C_1x + C_2y + C)$ *have zero total curvature.*

Consider the function $f(x, y)$ being the sum of two regular functions $U(x, y)$ and $V(x, y)$, that is

$$f(x, y) = U(x, y) + V(x, y).$$

Investigate now the connection between the total curvatures of the surfaces $f(x, y)$, $U(x, y)$, and $V(x, y)$. We denote the total curvatures of these surfaces by K, K_1, and K_2, respectively.

Theorem 2. *If the functions* $U(x, y)$ *and* $V(x, y)$ *satisfy the Cauchy-Riemann condition then the total curvature of the surface* $z = f(x, y)$ *is the sum of the total curvatures of these surfaces,*

$$K = K_1 + K_2.$$

These theorems help in solving surface reconstruction problems.

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