Agar parallelopipedda a=b bo'lsa ham bu egilishni xosil qilish mumkin, bunda S_1 va S_2 uchlar ustma-ust tushib qoladi.

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MONGE-AMPERE EQUATION AND THEOREMS ON THE THEORY OF SURFACES IN ISOTROPIC SPACE

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The theory of surfaces is related to the Monge-Ampere equation. Many mathematicians have worked with this equation. Solutions to the Monge-Ampere equation have also been applied to economics. Bang Yen Chen applied the solution of the homogeneous Monge-Ampere equation to economics.

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

Definition 1. [5] If the dot product of vectors $X\{x_1, y_1, z_1\}$ and $Y\{x_2, y_2, z_2\}$ is given by the formula

$$\begin{cases} (X,Y)_1 = x_1x_2 + y_1y_2, & (X,Y)_1 \neq 0 \\ (X,Y)_2 = z_1z_2, & (X,Y)_1 = 0 \end{cases}$$

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

We define the norm of a vector and the distance between the points with the help of the dot product. More precisely, the vector norm $|\vec{X}| = \sqrt{(\vec{X}, \vec{X})}$, the distance between the points $M(X)$, $N(Y)$ and $MN = \sqrt{(Y-X, Y-X)}$.

In coordinates, they have the following form

$$MN_1^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2 \quad (1)$$

if $MN_1 = 0$, then $MN_2 = |z_2 - z_1|$.

The motion, that is, a linear transformation that preserves the entered distance (1) , has the form [2]:

$$\begin{cases} x' = x\cos\alpha - y\sin\alpha + a \\ y' = x\sin\alpha + y\cos\alpha + b \\ z' = Ax + By + z + c \end{cases} \quad (2)$$

Let a regular surface be given in R_3^2 by the vector equation

$$\vec{r}(u,v) = x(u,v)\cdot\vec{i} + y(u,v)\cdot\vec{j} + z(u,v)\cdot\vec{k}$$

Then the first and second fundamental forms of the surface are determined by the following formulas [4]

$$\mathrm{I} = ds^2 = Edu^2 + 2Fdudv + Gdv^2$$

$$\mathrm{II} = Ldu^2 + 2Mdudv + Ndv^2$$

where E, F, G and L, M, N are the coefficients of the first and second fundamental forms, respectively.

In this space, let the surface F, given by the equation $z = f(x, y)$, is one-valued projection onto the plane Oxy, the total and mean curvature at the point of the surface are determined by the following formulas:

$$K = LN - M^2 \qquad 2H = L + N$$

by calculating these coefficients, then we have [1]

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

Where, the right-hand side of the total and mean curvatures of the surface determine the Monge-Ampere and Laplacian operators, respectively. It follows that the study of the geometric characteristics of the surface in isotropic space is interdependent on the Monge-Ampere and Laplacian operators.

It is known from the complex analysis, if the real and imaginary part of the holomorphic function satisfy the Cauchy-Riemann conditions, they would be harmonic functions. If we look at each of the real and imaginary part of function as a surface, we determine the interrelationship between these surfaces according to the geometric characteristics. If the substitution preserves the distance, it is know that in Euclidian space it transfers a surface to a surface equal to itself, generated by motion and differing only in position.

We have the following theorem for such surfaces in Euclidian space:

Theorem 1: If the surfaces given by the functions $u(x, y)$ and $v(x, y)$ in Euclidian space satisfy the Cauchy-Riemann conditions, then these surfaces are equal to each other and differ only in position.

Theorem 2: If the functions $u(x, y)$ and $v(x, y)$ are given in isotropic space and satisfy the Cauchy-Riemann conditions, the total and mean curvatures of the surfaces given by these equations are equal, but these surfaces are not equal to each other in the isotropic sense.

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CIRKULYANT GRAFLARDAǴÍ TAMÍRLÍ TOǴAYLAR SANÍ USHÍN ÓNDIRIWSHI FUNKCIYASÍŃÍŃ RACIONALLÍǴÍ HAQQÍNDA

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Jumıs haqqında qısqasha túsinik:

Meyli $s_1, s_2, \dots, s_k, 1 \leq s_1 < s_2 < \dots < s_k \leq \frac{n}{2}$ shártin qanaatlandırıwshı natural sanlar bolsin. n dana $0,1,2,\dots,n-1$ tóbeli $C_n(s_1, s_2, \dots, s_k)$ grafı *cirkulyant graf* delinedi, eger hár bir $i, i = 0,1,\dots,n-1$ tóbesi $i \pm s_1, i \pm s_2, \dots, i \pm s_k (\text{mod } n)$ tóbelerine qońsılas bolsa. Eger $s_k < \frac{n}{2}$ bolsa, onda graftıń barlıq tóbeleri $2k$ dárejeli. Eger n jup hám $s_k = \frac{n}{2}$ bolsa, onda barlıq tóbeler $2k-1$ dárejege iye ([1]).

Meyli $\Phi(x), \Gamma = C_n(s_1, s_2, \dots, s_k)$ yáki $\Gamma = C_{2n}(s_1, s_2, \dots, s_k, n/2)$ cirkulyant grafdaǵı $f_\Gamma(n)$ tamırlı toǵaylar sanı ushın óndiriwshi funkciyası bolsın. Biz $\Phi(x)$ tiń $\Phi(x) = -\Phi\left(\frac{1}{x}\right)$ shártin qanaatlandıratuǵın hám koeficientleri pútin sanlardan bolǵan racional funkciya ekenligin kórsetemiz. *Tamırlı terek* dep bir tóbesi belgilengen terekke aytamız. *Tamırlı toǵay* - bul qurawshiları baylanısqan tamırlı tereklerinen ibárát toǵay. *Tiykarǵı tamırlı toǵay* dep Γ grafındaǵı, Γ grafınıń barlıq tóbelerin óz ishine alıwshı tamırlı toǵayǵa aytamız. Bizler ápiwayı graflardı kórip shıǵamız.

Tiykarǵı nátiyje tómendegishe

Teorema 1. Meyli $f_\Gamma(n)$, jup dárejeli $\Gamma = C_n(s_1, s_2, \dots, s_k)$ yamasa taq dárejeli $\Gamma = C_{2n}(s_1, s_2, \dots, s_k, n)$ cirkulyant grafiniń tiykarǵı tamırlı terekleri sanı bolsın. Onda

$$\Phi(x) = \sum_{n=1}^{\infty} f_\Gamma(n) x^n$$

koeficientleri pútin sanlardan ibárát bolǵan racional funkciya. Bunnan tısqarı,

$$\Phi(x) = -\Phi\left(\frac{1}{x}\right).$$

Jumıstıń áhmiyetliligi:

Cirkuliant graflardaǵı toǵaylardı biriktiriw, matematikanıń tez rawajlanıp atırǵan hám pútkilley jańa tarawlarınan biridur. Jumıs sonı kórsetedi, cirkulyant graflardaǵı toǵaylardı biriktiriw óndiriwshi funktsiyanıń ratsionallıǵın tabıwdan