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Rassmotrena problem vesenney Preparation of soil for Seva saharnoy beet in soils tyazhelыh for mechanical composition. Technological proposals surgery and tehnycheskye sredstva for mynymalyzatsyy predposevnoy processing. Results of research Pryvedenы predlozhennoy technology.

Saharan beet, mynymalyzatsyya, rowing, vesennee vozdelыvanye, harrow, sowing, proyzvodytelnost.

The problem of spring preparation of soil is considered for sowing of sugar beet on soils heavy after mechanical composition. A technological operation and hardwares is offered for minimalizacii of preseed treatment. The results of researches of the offered technology are resulted.

Sugar beet, minimalizaciya, combs, spring till, cultivator, sitting down, productivity.

UDC 631,312

CALCULATION cylindrical surface scrapers HNOYEPRYBYRALNOYI INSTALLATION

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MI Ikalchyk, competitor *

The equation and constructed curves orthogonal section cylindrical surface on which the particle moves manure under the action of the staff. The trajectory of particles perpendicular to the surface of generators. The curve section is designed with the condition that at a constant speed of particles on the surface pressure is also constant.

Scraper, surface, pus equation curves particle.

Problem. Timely removal of manure from livestock buildings - one of the most important economic problems. The problem of manure consider including providing physiological comfort while keeping animals, and therefore quality manure in the minimum number of passes hnoyeprybyralnyh units.

Analysis of recent research. PhD Professor II REVENKO in the textbook [1, p. 456] noted that a significant impact on the quality of manure scraper has a form.

For quality manure scrapers should be possible to press the scraper to the surface hnoyevoho channel.

The process scraper movement is such that the front scraper is manure scraper and included a lot of manure in theory can be represented as a movement of the working body in the ground. This leads to consider the theory of Academician VP Horyachkina arguing that the work surface tillage machines observed [2, p. 18], despite the extreme diversity of working tillage implements, the working surface geometry of each reduced to a wedge, wedge that underlies and is a prototype for cultivators paws and other tillage machines.

The purpose of research. Develop a mathematical model calculation vhnutoyi working surface scraper scraper settings for manure.

Results. Based on the above it the most efficient construction scraper scraper settings will

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vhnuta working surface [3, p. 43]. To work effectively Scraper is necessary to ensure a constant pressure of manure moving on work surface scraper. To do this, find the equation and construct curves that are the trajectories of particle motion manure scraper on the work surface.

The movement of material particles in gravitational surfaces considered in monographs [4, 5]. As it is understood that the cylindrical surface of the horizontal generators, the motion of the particles can be studied on plane curves - orthogonal cross sections of these surfaces. The relevant sections of these works such surfaces and curves are called gravity, so that the movement of the particles due to force her weight.

The velocity curve in such cases variable. However, agricultural machines might be occasions when a particle moves along the surface with a constant speed (eg, involuntary movement of particles on the surface of the manure scraper [6]). In this case the particles except gravity, has another active force F_{TG} (Thrust).

We find these curves, the motion on which a constant speed particles exert constant pressure. Obviously, these curves have not gravity.

Find the curves that provide constant pressure at a constant velocity of the particles of manure on them. We make the assumption that the velocity of the particle is equal to the speed of the scraping of manure scraper on the channel.

Suppose that under the influence of particle staff of manure moving up the curve with constant speed *v* (Fig. 1). Find the equation of the curve is at a given speed *v* keeps the reaction F_{mum} surface is constant pressure on the surface. In practical terms, this surface will wear evenly and is less prone to sticky sludge. Will project all forces acting normal to home $\bar{n}$ curve:

$$mg\cos\alpha + mv^2k = F_{\text{тс}}, \tag{1}$$

where *k* - curvature of the curve at this point, *m* - particle mass, *g = 9,81m / s2*. Rewrite equation (1) by dividing the left and right parts to gravity *mg* and writing curvature *k* through the known value of differential geometry $k = \dfrac{d\alpha}{ds} = 1 : \dfrac{ds}{d\alpha} = \dfrac{1}{s'}$ Where *s* - the arc length of the curve:

$$\cos\alpha + \frac{v^2}{s'g} = \frac{F_{\text{тс}}}{mg}. \tag{2}$$

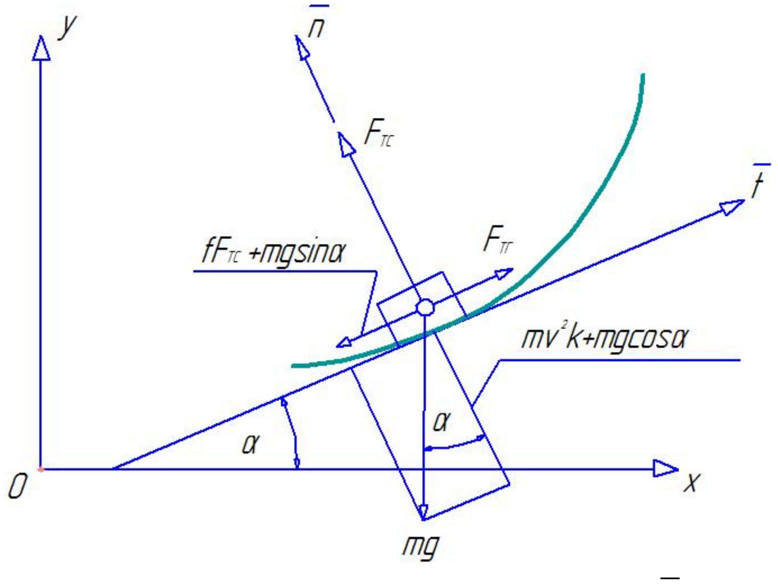


Fig. 1. Expansion of the forces normal to home $\bar{n}$ and tangent $\bar{t}$ curve.

Ratio F_{mum}/mg is a constant, it shows that the share of the total pressure forces the particle is a particle component weight. Denote it *and*$_{mum}$ and solve the equation (2) with respect to s':

$$\frac{ds}{d\alpha}=\frac{v^2}{g(a_{\text{тс}}-\cos\alpha)} \text{ Therefore } \quad k=\frac{g}{v^2}(a_{\text{тс}}-\cos\alpha). \qquad (3)$$

Integrating the expression (3) for two possible cases: $a_{mum}>1$ (Ie, the surface pressure is greater than the weight of the particles) and $a_{mum}<1$ (Pressure less weight particles). We write the corresponding integrals (continuous integration omitted):

$$s=\frac{v^2}{g}\int\frac{d\alpha}{a_{\text{тс}}-\cos\alpha}=\frac{2v^2}{g\sqrt{a_{\text{тс}}^2-1}}\operatorname{arctg}\sqrt{\frac{a_{\text{тс}}+1}{a_{\text{тс}}-1}}\operatorname{tg}\frac{\alpha}{2}, \quad (a_{\text{тс}}>1)$$

$$s=\frac{v^2}{g}\int\frac{d\alpha}{a_{\text{тс}}-\cos\alpha}=\frac{v^2}{g\sqrt{1-a_{\text{тс}}^2}}\ln\frac{(1+a_{\text{тс}})\operatorname{tg}\frac{\alpha}{2}-\sqrt{1-a_{\text{тс}}^2}}{(1+a_{\text{тс}})\operatorname{tg}\frac{\alpha}{2}+\sqrt{1-a_{\text{тс}}^2}}. \quad (a_{\text{тс}}<1) \qquad (4)$$

Equation (4) *s = s* (α) set the pattern of change of the angle α along the arc of the curve, thus defining a curve its intrinsic properties, regardless of its location in a rectangular coordinate system. In differential geometry curves adopted another record their inner equation - dependence on the curvature of the arc length *k = k (s)*. This equation is called the natural curve equation. Whom we obtain in both cases, if the right equation (3) and equation (4) exclude common parameter α:

$$k=\frac{g(a_{\text{тс}}^2-1)}{v^2\left[a_{\text{тс}}+\cos\left(\frac{g}{v^2}\sqrt{a_{\text{тс}}^2-1}\,s\right)\right]}; \qquad (a_{\text{тс}}>1)$$

$$k=\frac{2g(1-a_{\text{тс}}^2)e^{\frac{g\sqrt{1-a_{\text{тс}}^2}}{v^2}s}}{v^2\left(e^{\frac{2g\sqrt{1-a_{\text{тс}}^2}}{v^2}s}-2a_{\text{тс}}e^{\frac{g\sqrt{1-a_{\text{тс}}^2}}{v^2}s}+1\right)}. \qquad (a_{\text{тс}}<1) \qquad (5)$$

Natural equation (5) define curves regardless of their position and orientation of the plane. This means that when you turn the curve at a certain angle ε its natural equation does not change. For us this notation is not acceptable because the orientation of the curve in the plane will depend on vectors applied forces, so move on to coordinate entry form. How natural equations of rectangular coordinates describes known in differential geometry dependencies:

$$\frac{dx}{ds}=\cos\alpha; \qquad \frac{dy}{ds}=\sin\alpha. \qquad (6)$$

Rewrite dependence (6) by going to the independent variable α:

$$\frac{dx}{d\alpha}\frac{d\alpha}{ds}=\cos\alpha, \text{ звідки } \frac{dx}{d\alpha}=\frac{ds}{d\alpha}\cos\alpha.$$

Similarly,

$$\frac{dy}{d\alpha}=\frac{ds}{d\alpha}\sin\alpha. \tag{7}$$

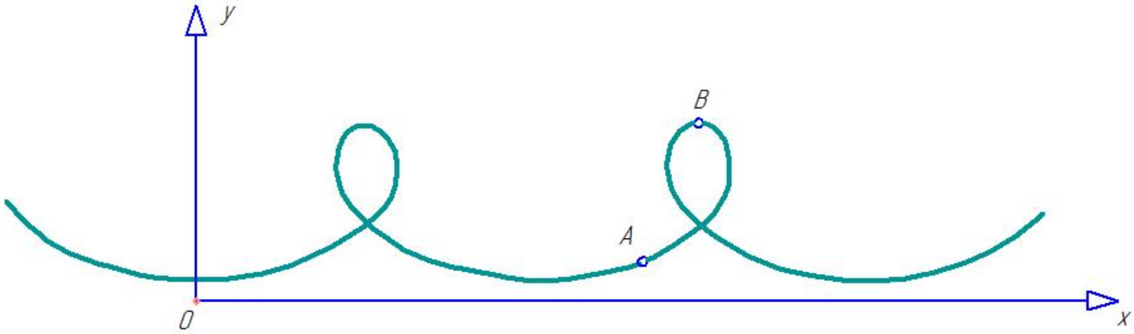
Substituting (7) expression $\frac{ds}{d\alpha}$ from (3), we obtain for the dependence of the coordinates *x* and *y* curve:

$$\begin{aligned} x&=\frac{v^2}{g}\int\frac{\cos\alpha d\alpha}{a_{\text{тс}}-\cos\alpha}=\frac{a_{\text{тс}}v^2}{g}\int\frac{d\alpha}{a_{\text{тс}}-\cos\alpha}-\frac{v^2}{g}\alpha;\\ y&=\frac{v^2}{g}\int\frac{\sin\alpha d\alpha}{a_{\text{тс}}-\cos\alpha}=\frac{v^2}{g}\ln(a_{\text{тс}}-\cos\alpha). \end{aligned} \tag{8}$$

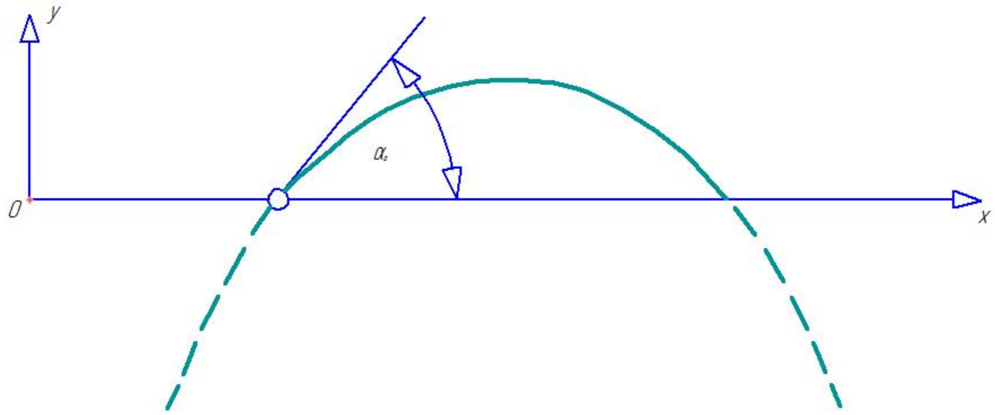
From (8) shows that the expression after integration *y = y (α)* has a simple look and look for the coordinates *x = x (α)* reduced to integrals (4), so it is divided into two depending for $a_{\text{mum}}>1$ and $a_{\text{mum}}<1$:

$$\begin{aligned} x&=\frac{2a_{\text{тс}}v^2}{g\sqrt{a_{\text{тс}}^2-1}}\operatorname{arctg}\sqrt{\frac{a_{\text{тс}}+1}{a_{\text{тс}}-1}}\operatorname{tg}\frac{\alpha}{2}-\frac{v^2}{g}\alpha; && (a>1)\\ x&=\frac{a_{\text{тс}}v^2}{g\sqrt{1-a_{\text{тс}}^2}}\ln\frac{(1+a_{\text{тс}})\operatorname{tg}\frac{\alpha}{2}-\sqrt{1-a_{\text{тс}}^2}}{(1+a_{\text{тс}})\operatorname{tg}\frac{\alpha}{2}+\sqrt{1-a_{\text{тс}}^2}}-\frac{v^2}{g}\alpha. && (a<1) \end{aligned} \tag{9}$$

In (8), (9) the constants of integration are omitted because they affect only the transfer curve along parallel axes *Ox* and *Oy.*



a)



b)

Fig. 2. The curves that provide constant pressure at a constant velocity of particles: a) ats = 1.2; v = 0,2 m / s; b) ats = 0; v = 0,2 m / s.

Fig. 2, a and b are constructed curves with equations $y = y\ (\alpha)$ from (8) and $x = x\ (\alpha)$ of (9) to $a_{mum} > 1$ and $a_{mum} < 1$.

Fig. 2 and shows the curve section surface pressure at which a given speed $v = 0{,}2\ m\ /\ s$ greater weight particles 1.2 times. Plot the curve $\widehat{AB}$ can be considered as a possible profile scraper scraper settings.

If $a_{mum} < 1$ Ie the surface pressure should be less than the weight of the body, this decline is possible due to the fact that the body will move on the outside of the convex curve. Fig. 2b curve constructed for both $a_{mum} = 0$ Ie pressure on it is zero. For a given speed v such a curve exists for values of angle α a certain period. In practice this curve can not be used because it has no effect on the particle and can be regarded as marginal curve. This does explain the following example. Let the curve (Fig. 2b) will profile scraper. Once the particle reaches the manure scraper design speed to disappear on pressure scraper, so he will not be able to maintain this rate further because of the absence of friction. On the other hand, if you still manage to maintain particle manure somehow design speed (for example, by reactive power), the subsequent trajectory of the particle will be determined by the curve manure scraper even in his absence. So for the design profile scraper take the first option shown in Fig. 2 as well.

Conclusion. The mathematical model allows us to calculate the optimal work surface scraper scraper setting in which a layer of manure scraper will press on and pressed it to the bottom of the manure channel, resulting in better quality manure.

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Will provide a equation and be built kryvыe orthogonal cross-section tsylyndrycheskoy surface, in kotoroj dvyzhetsya manure particles pod action forces podpora. Traektoryya particle motion perpendicular obrazuyuschym surface. Opens up cross-section rasschytana IZ terms, something in postoyannoy Speed particles on the surface pressure of EE tozhe javljaetsja postoyannыm.

Scraper, Surface, manure, equation, kryvыe, particles.

Obtained equations and curves constructed orthogonal sectional cylindrical surface on which particle moves under action of manure backwater. The trajectory of particle perpendicular to surface of generators. Section curve calculated from condition that constant speed of particles on surface pressure is also constant.

Scraper, surface, manure, equation, curves, particle.