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Path is set out solutions Problems of diagnosis physiological STATUS animal, namely disease limbs, based otsenki podvyzhnosty ego. Using Obosnovano system vydeoanalyza in Bazet sensor-камеры «Kinect» ynfrakrasnым with radiation in kachestve tehnycheskoho sredstva dyahnostycheskoy building a system.

Diagnosis, disease limbs, Kinect, podvyzhnost system.

The way *of problem's solving of diagnosis of animal's physiological condition, namely limbs' disease, based on an assessment of its mobility is expounded. Use of a video surveillance system based on sensor cameras «Kinect» with infrared radiation, as a technical tool for building diagnostic system, is grounded.*

Diagnosis, diseases of extremities, Kinect, mobility of system.

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Theoretical study of the interaction of working bodies subsoil with soil

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The resulting mechanical-mathematical model of the interaction of the working body subsoil with soil. Ante stress resistance and road jams ground for its different layers.

The soil, subsoil, mechanics and mathematical model, the stress state, jam.

Formulation of the problem. Mechanical tillage plays equally important role in the formation of the crop in all soil under normal weather conditions. Machining of soil - a process of interaction between agencies working machines (guns) and soil. Mechanical tillage means that the soil is deformed by the forces that occur during the interaction of working tools from soil. in the creation of tools can change the size and shape of the surface of the work, hence the forces acting on the ground.

Soil reaction force is applied to the resistance of soil treatment. The response to the action of the working body part - it forces along the contact surface of the working body, which extend from the surface of the contact depth, causing the first seal, and the destruction of soil, depending on its moisture and texture. A separate task is to create a mathematical model of the process of interaction with the soil working environment that emerged due to long-term irrigation, which led to the distribution of layered soils and high density of their heterogeneity [1].

Analysis of recent research. Past studies [2] the stress state of the soil under the influence of work did not lead to obtaining practical results. Numerous attempts to use research methods [3] elastic materials to analyze stresses in the soil, also to no avail, as the relationship between the force acting on the soil and soil deformation is a function of soil environment. Unfortunately, the world little attention is paid study changes in ground conditions during machining. In studies of the interaction of working with soil during machining taken to fix some physical and mechanical characteristics of the soil that affect the efficiency and the nature of this interaction: soil moisture; hardness and strength of the soil; friction on the surface of the soil working body in motion; difficulty ground; abrasive properties of soil. Almost all soil properties, including the above, depending on soil moisture.

The purpose of research. To explore the process of layering (I 0-15 cm layer, the second layer 15-0,25 cm, 25-40 cm layer III) deformation of the soil environment by working tiered subsoil.

Results. Consider the interaction of the working body of the subsoil layer of soil. The working body is a dihedral wedge. According to [4] the value of the resistance dihedral wedge is:

$$F = \sum F_{\text{тер.}} + F_{\text{деф.}}, \qquad (1)$$

where ΣFter. - The total soil resistance force of friction forces, N;

Fdef. - The resistance of soil deformation, N.

When using wedge in homogeneous soil properties ΣFter component. has a constant value, and ΣFdef. periodically changes from zero to some maximum value, due to the cyclical nature of soil deformation under the action of the wedge. The variation of the resistance strain soil depends on its physical and mechanical properties and moisture. According to experimental studies [5, 6] accept that the dynamic power of resistance to deformation of soil changes in law sinus (Fig. 1).

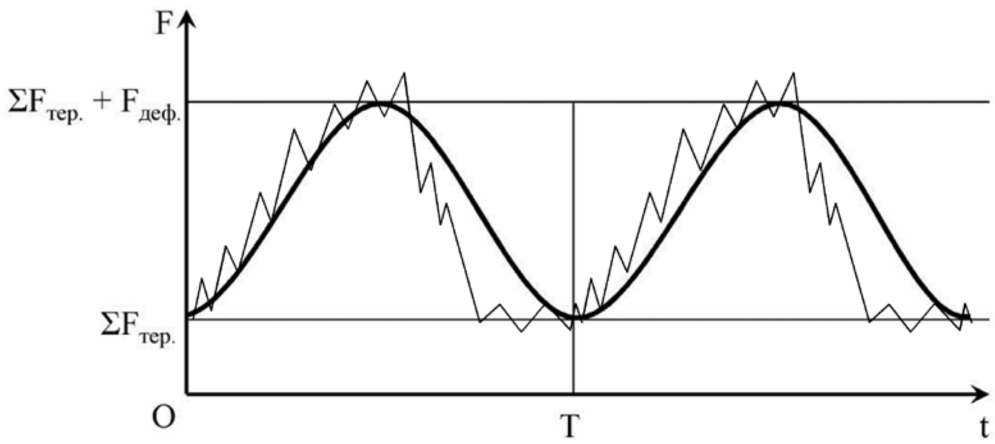

Fig. 1. Dynamic dependence of the resistance to deformation of soil:
1 - experimental research data [5] 2 - line approximation.

This process of "compression-destruction" fleeting and under certain conditions the wedge can go into a state of shock load. AN Gudkov, GA Dehraf, KG Harutyunyan, V. Katsyhin, YF Novikov [6] and a number of other researchers working of interaction with a ground view based on the velocity distribution of stresses and strains in the soil.

In a narrow range of variation of speed relationship between intensity of soil resistance and strain rate can be described by linear equations [7]:

$$\sigma = \sigma_n \left(1 + K_p V\right), \quad (2)$$

where σ - tension resistance of soil, Pa;

Kr - coefficient taking into account the relaxation properties of soil, Rp = 0.25 Pa · s / m;

V - velocity deformation of soil (speed tractor), m / s;

σn - instant stress resistance of soil, Pa.

Therefore, the stress state in the soil depends not only on the magnitude of deformation, but also on the rate at which the developing process of deformation. From this we can conclude that the application of shock loads on the ground is higher tension. This limits its fracture strength increased.

To determine the instantaneous stress resistance of soil consider elementary area which are normal and shear stress (Fig. 2).

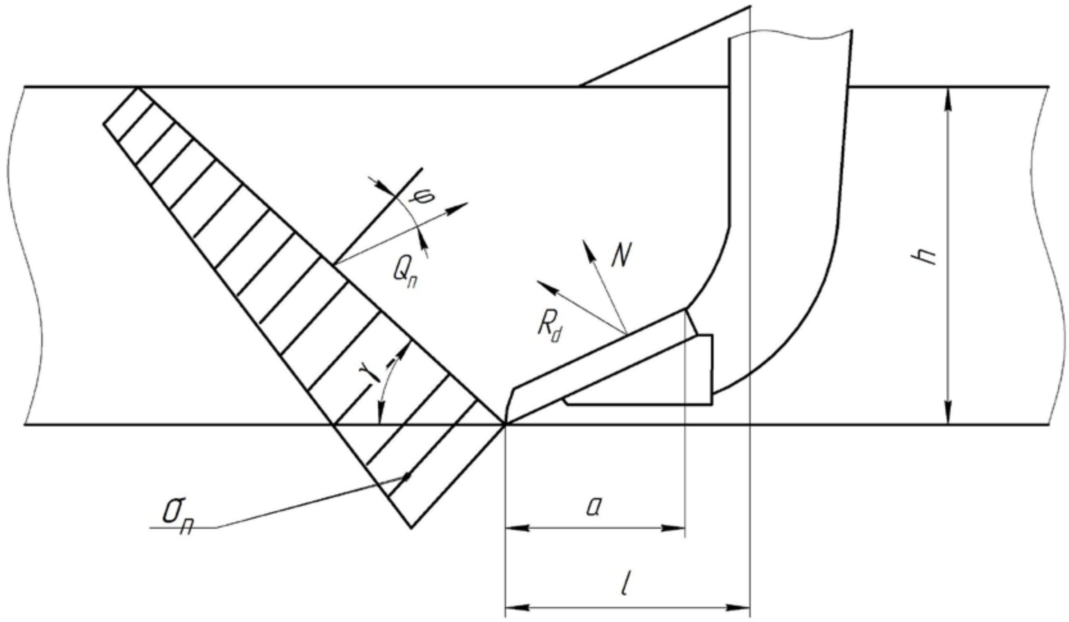

Fig. 2. Scheme of the stress on the elementary playground soil: γ - angle Rally soil in the transverse direction; σn - limit equilibrium; Rd - resultant force; Nn - normal reaction force.

Tensions in the region limit equilibrium points for basic ground plane determined by the system of five equations [9]:

$$\begin{cases} \frac{\partial \sigma_x}{\partial x} + \frac{\partial \tau_{xy}}{\partial y} = \gamma, \\ \frac{\partial \tau_{xy}}{\partial x} - \frac{\partial \sigma_y}{\partial y} = 0, \\ \frac{(\sigma_x - \sigma_y)^2 + 4\tau_{xy}^2}{(\sigma_x + \sigma_y + 2C_0 \operatorname{ctg}\varphi)^2} = \sin^2 \varphi, \\ \sigma_n = \frac{1}{2}(\sigma_x + \sigma_y) - \cos\varphi \sqrt{\frac{1}{4}(\sigma_x - \sigma_y)^2 + \tau_{xy}^2}, \\ \tau_n = \sin\varphi \sqrt{\frac{1}{4}(\sigma_x - \sigma_y)^2 + \tau_{xy}^2}, \end{cases} \tag{3}$$

where τ_{xy} - Shear stress, Pa; σ_x,σ_y - Normal stress along the axes Ox and Oy respectively, Pa; τ_n - Limiting shear stress, Pa; C0 - soil adhesion, Pa; φ - Angle of internal friction of soil councils; γ - unit weight of soil N / m3;

$$\gamma = \rho \cdot g \,; \tag{4}$$

where ρ - density of the soil, kg / m3; g - gravitational acceleration, m / s2.

According to experimental studies [8] clutch C0 and angle of internal friction φ soil depends on the humidity W0 (Fig. 3 - 4):

$$C_0 = -2{,}25 \cdot 10^{-4} W_0^3 + 1{,}37 \cdot 10^{-2} W_0^2 - 1{,}99 \cdot 10^{-2} W_0 \,, \tag{5}$$

$$\varphi = -4{,}13\cdot10^{-4}W_0^2 + 1{,}66\cdot10^{-2}W_0 + 4{,}51\cdot10^{-1}, \qquad (6)$$

where W0 - layer soil moisture,%.

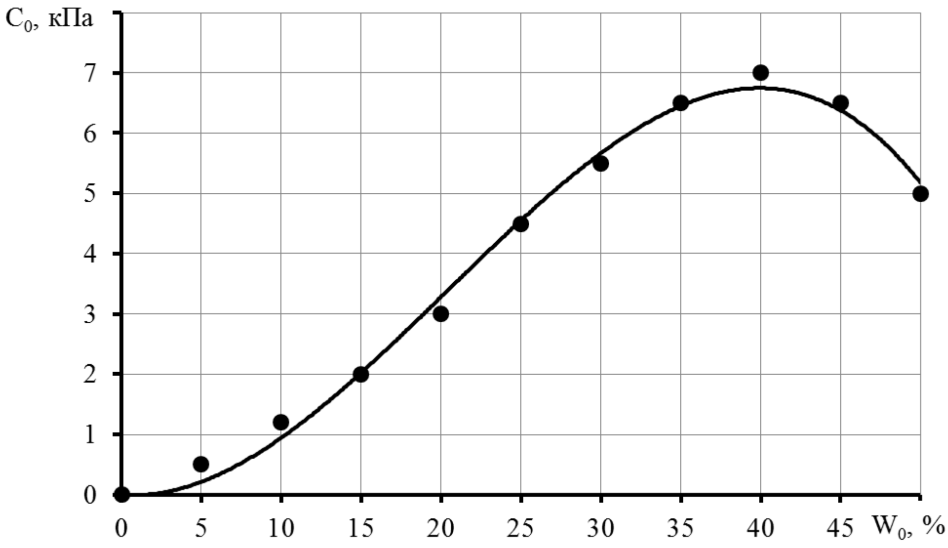

Fig. 3. Dependence clutch C0 soil moisture from its W0.

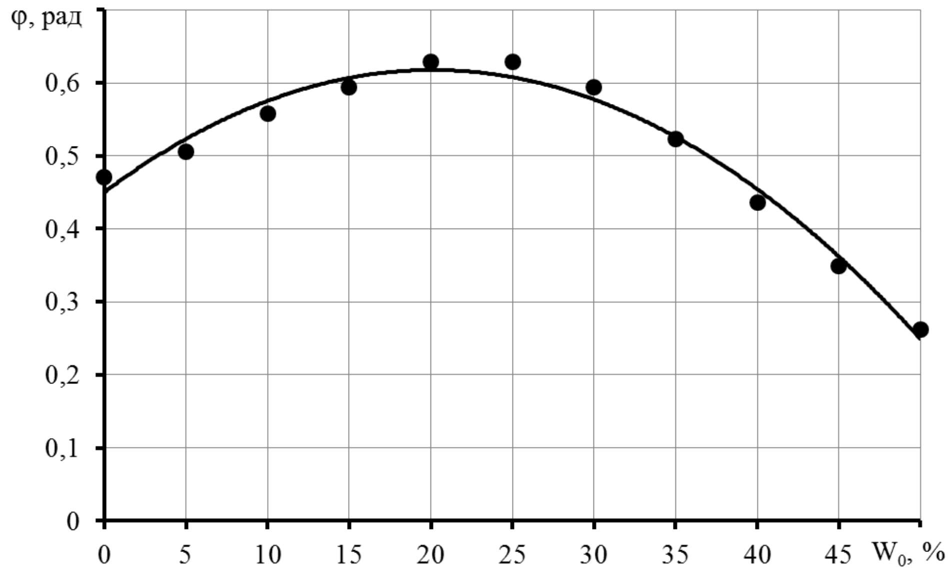

Fig. 4. The dependence of the angle of internal friction φ Soil moisture it W0.

According to equation Coulomb-Mohr, the resistance shear fracture surfaces defined by a linear function of normal stress of soil:

$$|\tau_n| = C_0 + \sigma_n \mathrm{tg}\varphi \ . \qquad (7)$$

However, the use of the method for determining the Coulomb limit equilibrium gives large errors. More accurate results allows to obtain a method developed VV Sokolovsky, which is as follows [9]. Covenant limiting resistance preceding the destruction of the soil can be written as follows:

$$\max\{|\tau| - (C_0 + \sigma_n \mathrm{tg}\varphi)\} = 0 \ . \qquad (8)$$

The system of equations (3) and (8) describes the ultimate state line and outline slide. However, in an explicit form, these equations are very difficult to solve, because using the software package Maple 16 using methods of numerical computation of differential equations in partial derivatives obtained values of the instantaneous stress resistance of soil for each soil layer:

– And layer (ρ = 1430 ... 1460 kg / m3, W0 = 9 ... 11%) σn = 30,8 ... 50,9 kPa;

– The second layer (ρ = 1340 ... 1560 kg / m3, W0 = 24 ... 26%) σn = 170,1 ... 183,5 kPa;

– Third layer (ρ = 1280 ... 1390 kg / m3, W0 = 14 ... 16%) σn = 105,1 ... 129,3 kPa.

After modeling of the working body of the subsoil soil in the software package SolidWorks 2013 and received PLAXIS distribution of tension in your body and the way the jam soil (Fig. 5):

– And layer (ρ = 1430 ... 1460 kg / m3, W0 = 9 ... 11%) l = 1,01 ... 1,23 m;

– The second layer (ρ = 1340 ... 1560 kg / m3, W0 = 24 ... 26%) l = 0,83 ... 0,96 m;

– Third layer (ρ = 1280 ... 1390 kg / m3, W0 = 14 ... 16%) l = 0,44 ... 0,56 m.

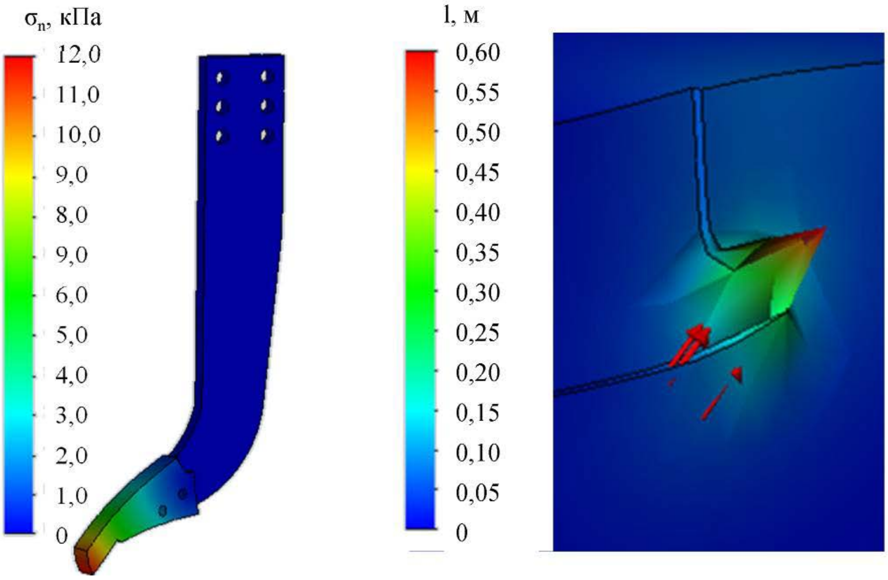

Fig. 5. Modelling the interaction of the working body hlybokorozpushu-in-Chief of the soil software packages SolidWorks 2013 (a) and PLAXIS (b).

Due to Fig. 2 and Fig. 3 and equation (1) and (2) have finally

$$F = \sum F_{\text{тер.}} + F^{max}_{\text{деф.}} \sin \omega t , \quad (9)$$

where $F^{max}_{\text{деф.}}$ - The maximum power of resistance to deformation of soil N;

$$F^{max}_{\text{деф.}} = \sigma \cdot l \cdot a \cdot \sin \alpha ; \quad (10)$$

l - path jams soil, m;

a - Length of loosening the clutches of the working body of the city;

α - angle crushing paw working body, m;

ω - The frequency variation of soil deformation resistance, s-1;

$$\omega = \frac{V}{l}. \tag{11}$$

Conclusions

1. The resulting mechanical-mathematical model of the interaction of the working body of subsoil with soil linked to each other and stress resistance ground path jam on its physical and mechanical properties (density and moisture).

2. According to the calculation mechanics and mathematical models were obtained value σn stress resistance and crushing ground path l for each of its layers:

– And layer (ρ = 1430 ... 1460 kg / m3, W0 = 9 ... 11%) σn = 30,8 ... 50,9 kPa, l = 1,01 ... 1,23 m;

– The second layer (ρ = 1340 ... 1560 kg / m3, W0 = 24 ... 26%) σn = 170,1 ... 183,5 kPa, l = 0,83 ... 0,96 m;

– Third layer (ρ = 1280 ... 1390 kg / m3, W0 = 14 ... 16%) σn = 105,1 ... 129,3 kPa, l = 0,44 ... 0,56 m.

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Mechanics will provide a model matematycheskaya-process interaction Rabocheye body Glubokoryhlitel with soil. Opredelenы value *napryazhennosty Resistance and path smyatyya soil for raznыh uh layers.*

Soil, Glubokoryhlitel, mechanics-matematycheskaya model napryazhennoe STATUS, smyatye.

Received mechanical-mathematical model of interaction of working body subsoilers with ground. The values of intensity and path collapsing soil for its various layers.

Soil, deep, mechanical-mathematical model, stress, collapse.

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Wear-resistant coatings FOR WORKING OF AGRICULTURAL MACHINES

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KO Sidorenko, Chief Technologist
DKTB Paton. EO Paton

In this paper, an analysis of modern methods of strengthening the work of tillage machines discussed their advantages and disadvantages. It is shown that the most effective method of strengthening working surfaces of tillage machines are strengthening point arc spot welding flux cored wire.

Abrasive wear, disc harrow, cultivator paw, ploughshare plow, wear-resistant coating durability.

Problem. One of the urgent problem of Mechanical Engineering is working to increase durability of tillage machines. The nature and intensity of wear of the working bodies tillage machines depends on the physical properties of the soil. Thus, the sandy soil wear parts in thickness, on a clay loam and width. Thus on sandy soil in parts wear out 8-10

faster than clay. Ploughshare plow is one of the fastest irrigation working bodies. The main reason - accelerated abrasive wear caused by the interaction of solid (NV 8-11 GPa) mineral particles contained in the soil. Analysis of the causes of culling serial plowshares showed that more than half of plowshares that a substantial margin nespratsovanoho metal width, discarded because of premature wear socks. Currently, for the