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RaProblems ssmotrenы Exit IZ Story of major organs reshetnыh workers and zernodrobylka s Effect on Quality yzmelchenyya grain.

***Zehrnodrobylka, sieve, drobylnыe hammers, fan, эkspluatatsyya, yznos*.**

The problems of failure of main working bodies reshetnyh grain crusher and their impact on quality of grain refinement.

Grain crusher, screen, crushing hammers, fan operation, wear.

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TETheoretically basis for determining conductive PROPERTIES OF SOIL ENVIRONMENT

OO Brovarets, Ph.D.

The paper presents the theoretical basis for describing the conductive properties of the soil environment obtained by monitoring the status of agricultural land and turned empirical dependence to improve the accuracy of the results.

Thenchne agriculture, monitoring, conductive properties, groundwater environment.

AnaLiz recent research. One of the main approaches in the application of precision farming technology - to optimize productivity and ensure environmental quality of agricultural products and agricultural zone management field. In this aspect plays an important role determining soil electrical conductivity for the determination of the profit based on spatial variability and nutrient content of the soil. Knowledge of a variability of soil structure allows us to take management solution through technology precision agriculture [1].

The structure of the soil varies considerable limits on many agricultural fields. The physical properties of the soil, such as soil structure, have a direct effect on water consumption, cation exchange capacity, productivity and more. Nutrient rechoguilt contained in soils, plants used and their content in the soil are reduced. The common characteristic nutrient content of the soil is nitrogen, whose presence in the soil largely determine yield. Mapping soil electrical conductivity, widely used as a means to display soil structure and other soil properties [2].

Wdescription notable variability of agricultural land - an important component for zonal management, including precision farming technology.

Pointnot agriculture requires accurate data on the nutrient content of the missing in the soil to achieve maximum profitat the least cost. Obviously, the sensor ground thlektroprovidnosti - a useful tool in mapping of soils to identify the region variability of soil properties [3].

Metand lit.idzhen. Ourth spetsyfichnoyu IUthenth fromand Qim research is to obtain a semi-empirical models to determine the conductive properties of the soil environment based on existing methods for determining the conductive properties.

Empirychni dependence to determine the conductive properties. RoseLet us consider n-contour circuit that consists from jAireland stressesand ei, actsments RezaStory R_{ik}, condensatoriv capacity C_{ik} and kotushofor inductance L_{ik}.

The current in i_i-m contour:

$$i = \frac{dq_{i\,i}}{dt} = \dot{q}_i \quad (i_i = 1,2,...,n), \qquad (1)$$

where $q_з$ – forilkist electricity.

Enerhiya magnetic field of the chain:

$$T_e = \frac{1}{2}\sum_{i=1}^{n}\sum_{k=1}^{n} L_{ik}\dot{q}_i\dot{q}_k \qquad (2)$$

Enerhiya electric field:

$$U_e = \frac{1}{2}\sum_{i=1}^{n}\sum_{k=1}^{n}\frac{1}{C_{ik}} q_i q_k. \qquad (3)$$

DysypatyVNA function, uabout characterizedthere is toexpensesin enerBIR Categoriesandactsvnomu resistance:

$$F_e = \frac{1}{2}\sum_{i=1}^{n}\sum_{k=1}^{n} R_{ik}\dot{q}_i\dot{q}_k. \qquad (4)$$

The total power dissipation and function of the ratio of bound:

$$Q_{iR} = -\frac{\partial F_e}{\partial \dot{q}_i} \qquad (5)$$

Mental work voltage in an electrical circuit:

$$\delta' A = \sum_{i=1}^{n} u_i \delta q_i. \qquad (6)$$

RoseLook characteristics of mechanical and electrical systems are similar. For comparison of dynamic equations of electrical circuit can be used Lagrange equation of the second kind (Maxwell-Lagrange equation), if the generalization coordinates Acceptedand the amount of electricity $q_i, i = 1,2,...,n$.

DA mechanical system:

$$\frac{d}{dt}\left(\frac{\partial T}{\partial \dot{q}_i}\right) + \frac{\partial U}{\partial q_i} + \frac{\partial F}{\partial \dot{q}_i} = Q_i \quad (i = 1,2,...,n). \qquad (7)$$

DFor electrical system:

$$\frac{d}{dt}\left(\frac{\partial T_e}{\partial \dot{q}_i}\right) + \frac{\partial U_e}{\partial q_i} + \frac{\partial F_e}{\partial \dot{q}_i} = e_i \quad (i = 1,2,...,n). \qquad (8)$$

The last equation expresses the second law Kirhofa for electric circuit, the algebraic sum of electromotive force in any circuit is equal to the algebraic sum of the voltage drop across the circuit elements. The kinetic energy of the mechanical system is the magnetic field energy, potential energy - electric energy field, Dissipative function - function F_e and generalized force Q_i - thlektrorushiyna force e_i. Pivnyannya for systems with one system freedom (n = 1) is:

$$a\ddot{q} + b\dot{q} + cq = Q(t) \qquad (9)$$

and

$$L\ddot{q} + R\dot{q} + \frac{1}{C}q = e(t). \qquad (10)$$

Pivnyannya describes the forced vibrations of mechanical systems with one degree of freedom, the equation - forced oscillations in single contour chain. For electrical system with n pairs of nodes in thatand generalized coordinates for the selected electrical voltage u_i, we have the following expressions.

Enerhiya magnetic voltage:

$$T_e = \frac{1}{2}\sum_{i=1}^{n}\sum_{k=1}^{n} C_{ik}\dot{u}_i\dot{u}_k. \tag{11}$$

Enerhiya electric field:

$$U_e = \frac{1}{2}\sum_{i=1}^{n}\sum_{k=1}^{n} \frac{1}{L_{ik}}\dot{u}_i\dot{u}_k. \tag{12}$$

DysypatyVNA function, uabout characterizedthere is toexpensesin enerBIR Categoriesandactsvnomu resistance:

$$F_e = \frac{1}{2}\sum_{i=1}^{n}\sum_{k=1}^{n} R_{ik}\dot{u}_i\dot{u}_k. \tag{13}$$

Tuso the kinetic energy of the mechanical system is the electric field energy, potential energy - the energy of the magnetic field, the generalized force - the rate of change of current. Lagrange equation of the second kind for the electrical system for analogue "force-current" first law expresses Kirhofa: algebraic sum of the currents in uzli zero.

Dyferentsialne equation for the electric circuit of one pair of nodes:

$$C\ddot{u} + \frac{1}{R}\dot{u} + \frac{1}{L}u = \frac{di}{dt} \tag{14}$$

The tables are expressions for the potential and kinetic energy dissipative function and generalized forces system with one degree of freedom for different type counterparts.

The expression for analogies "force-voltage" and "power-current".

Systems and analogue	Generalized coordinates	Summarize in force	Stageethical energy	Potential of lna energy	Dysypaty-BHand function
Mehanichna	$q(t)$	$Q(t)$	$\frac{1}{2}m\dot{q}^2$	$\frac{1}{2}cq^2$	$\frac{1}{2}bq^2$
Shareektrychna "Syla-Categoriesapruha"	$q(t)$	$e(t)$	$\frac{1}{2}L\dot{q}^2$	January 1 $\frac{1}{2C}q^2$	1 $\frac{R\dot{q}^2}{2}$
"Electric "Syla-current"	$u(t)$	$\frac{di}{dt}$	$\frac{1}{2}C\dot{u}^2$	January 1 $\frac{u^2}{2L}$	January 1 $\frac{\dot{u}^2}{2R}$

Elektromehanight system. PoyeAssociation of mechanical and electromechanical systems in your unit, which turns mechanical energy into electromagnetic called electromechanical system.

DA system with n degrees of freedom forced vibration equation has the form

$$A\ddot{q} + B\dot{q} + Cq = F(t). \quad (15)$$

where $F(t)$ – column matrix of generalized external forces.

Operating method of solution. Byapplication of Laplace transform to differential equations leads to a system of linear algebraic equations:

$$(Ap^2 + Bp + C)q_*(p) = F_*(p) + (Ap + B)q_0 + A\dot{q}_0 . \quad (16)$$

where $q_*(p)$ and $F_*(p)$ – matrytsya-column Imagestion, moDPOknowing matrix $q(t)$ and $F(t)$; vectors q_0 and $\dot{q}_0$ toIZNacha initial conditions.

Whirlpoolishuyut receivesmana withandtems napryksystem Sectionabout regulationsin KraMayor, fromfinds toectop Imagestion $q_*(p)$. Uselast one fromGate Peretusion Laplace gives the desired solution.

Noised Funktsiy Decemberying. ChaSTKO pishennya pivnyannya it is possible prevput in the form:

$$q_{and}(t) = \sum_{k=1}^{n}\int_0^{l} h_{ik}(t,\tau)F_k(\tau)d\tau . \quad (17)$$

It consists of a linear springs and dampers, the connection somehow. Various compounds can simulate different equations linking stress strain □□, def

Comprehensive specific conductivity of porous dielectric material depends on two components [4]

$$\varepsilon^* = \varepsilon_r - j\varepsilon_i . \quad (18)$$

where ε^* – Compcontribute to discussion Dielektrychnand specificand aboutvidnist $\varepsilon^* = \frac{\varepsilon}{\varepsilon_0}$ (Bezrozdimensional); □ - Conductivity of porous material (F/m) ε_0- Free areas conductivity (8.854 x 10^{-12} F/m); j - Imaginary orArctic Ocean $\sqrt{(-1)}$;ε_r – virtual component

ε^*; ε_i- Associ ated with loss

thnerhiyi caused mainly by two coefficients, molecular relaxation and dc conductivity [5]:

$$\varepsilon_i = \varepsilon_{i,mr} + (\sigma / 2\pi\varepsilon_0). \quad (19)$$

where $\varepsilon_{j,mr}$ – modrelatively specificand aboutvidnist bythankfulness momolecular aboutslablennyu (dimensionless); - low frequency conductivity (S / m);

f- Frequency (Hz).

Real Chastyna Dielektrychnoth Pitotmy aboutvidnosti ε_r Safety ofmedium affected by water content, water content is about 80% and only about 4,4-6% of total minerals [6] land until the variable affects the salinity of the soil. Using these principles may indirectly estimate the water content in the soil

bythose from the actual weight ε_r and conductivity of porous material □□, which

test - this electric pulse sensor that operates at a frequency of 50 MHz corrected. This is the cheapest-to-use method used to estimate the volume

contents and fromand assisment gpyntovoyi tdi ε_i Usestovuvannya ε_r

thmpirychnyh defined dependencies [7].

Bazhlyvoyu problem determination method Hydra Probus is that the results should be identified by the formula (18), ie molecular attenuation and low frequency conductivity is not possible Rosedivided from each other. Often it is assumed that the $\varepsilon_{j,mr}$ and contribution ε_i uyutnenky very, veis small [8]. Conductivity in Hydra Probus then calculated from only the imaginary conductivity [9]:

$$\sigma_d = (\varepsilon_i 2\pi f \varepsilon_0) \quad (20)$$

where σ_d – dielectric conductivity (S / m).

Equation (20) is suitable for the prediction of transformer Hydra Trial [10]. The dielectric conductivity (□) In (19) is usually equivalent to the electrical conductivity (ie formula (19) of the soil within a certain class of most soils [11]. Therefore, it is best to assume that the dielectric conductivity (□) is equivalent to the existing specific electrical conductivity of the earth (□).

Yousmoke massive electrical conductivity of the earth can be separated into two components [12]:

$$\sigma_A = \chi\sigma_w + \sigma_S. \quad (21)$$

where χ - geometrychtion coefficientitsiyent, Wormsand toracounted Categorieserehupolar devicprevalence of water in the pores of the soil; □ – thlektrychna conductivity (S / m); σ_S – electricand the conductivity of the solid phase of the soil (S / m).

Formula (21) mothe same expressedI in

moDPOVienna FaureE to soil konduktsiyi and second terms [13, 14]:

$$\sigma_A = \Theta\upsilon\, T(\Theta_\upsilon)\sigma_w + \sigma_S, \qquad (22)$$

where Θ_υ – about'Ample moisture content (see ^{3}/Cm^3) $T(\Theta_\upsilon)$ – coefficientsiyent (also known as tortuosity, and the geometric factor or tin) regiving as a function of Θ_υ.

Most methods use electromagnetic, □□ and can Θ_υ

VHinyuvatysya a special sensor calibrated for specific soils and conditions. At 50 MHz by Hydra Samples estimate the apparent specific electrical conductivity, which depends on the imaginary part dielectric conductivity, □□ and determined using formulasand (21). Although values for can different from ε_iThis is □□

necessary to toPSIin betterx noiseVirgins VHinyuvannya aboutvidnosti timestosti soil o_w. Theoretically, the conductivity of the pore water - is the best

Soil salinity index because it is associated with soil root system [15] and therefore bound under very general salinity of the ground with their general parameters of the nutrient content. Thus, knowledge of the complete soil conductivity makes it possible to decide for effective management of farmland.

Yesneither Sampless epyntovyh aboutto Chahundred onla youmeasured σ_w

unreliable and prone to random error. In addition, the composition of the soil structure composition often varies in space and time. Ago

cth willingbut thesewhine toykorystovuyut toilsh toelychynin σ_w easyand

performed by indirect measurements. Electromagnetic sensors - is an attractive alternative for such purpose, mainly because they can, in theory, provide any place with minimal

costs, to modeE Realtion to estimate the time o_w, asand

byis the water content in the soil. To determine the conductive properties of the soil environment offers two models.

Model1 b. Volumetric water content can be assessed:

$$\Theta_\upsilon = A\sqrt{\varepsilon_r} + B \qquad (23)$$

where A and B - empirical coefficients compliance.

Usestovuyuchy formulasin (23) coefficientitsiyent Transmissionand - this functionsI water content $T(\Theta_\upsilon)$. Since then, as the water content estimated from ε_r,*T*

coveredNan also be some function for ε_r. The involvement of well-known the linear form T:

$$T = \alpha\Theta\nu + b. \qquad (24)$$

where a and b are empirical coefficients compliance. Substituting formula

(23) In (24) we get:

$$T = \tilde{N}\sqrt{\varepsilon_{\hat{e}}} + D. \qquad (25)$$

where $D = (\alpha B + b)$.
$C = \alpha A$and

Substituting formulas (23) and (25) in equation (19) and combining empirical coefficients, we obtain:

$$\sigma_{\grave{a}} = (\alpha\sqrt{\varepsilon_r} + \beta\varepsilon_r + \gamma)\sigma_w + \sigma_s. \qquad (26)$$

Equation (26) is equivalent to the dielectric formulas (20) and (21). In the formula (26), transfer factor assumes the form of a new dielectric relationship:

$$T_d = \alpha\sqrt{\varepsilon_r} + \beta\varepsilon_r + \gamma, \quad (27)$$

where T_d – Dielektrychnyand transfer coefficient.

Replace the formula (20) in equation (31) and solution σ_w We can determine σ_w bythose from ε_r and ε_i Model will have the following couplemeters:

$$\sigma_w = (\varepsilon_i 2\pi f\varepsilon_0 - \sigma_s) / (\alpha\sqrt{\varepsilon_r} + \beta\varepsilon_r + \gamma), \quad (28)$$

where $\varepsilon_i 2\pi f\varepsilon_0 = \sigma_a^d$ Wormsand equivalent to σ (S / m). This new model aboutvidnosti water pores mathematician simple and valid for any value $\varepsilon_r \geq 0$ real conductivity of solid particles (σ_s). From timein a σ_a theorynd will always be equal to or greater than as model stimulated sheng $(\varepsilon_i 2\pi f\varepsilon_0 - \sigma_s) \geq 0)$. Value UAAandmennyk in shapeLee (28) coveredNan be greater than zero, since a zero, leveling vague and negative outlook is not physically meaningful.

Modelb 2. Dla youdoctrinethlektroprovidnyh owandstyvostey soil environment, using semi-empirical and hydraulic model [16], we obtain transfer coefficient in the formula (21) takes the following form:

$$T = \Theta_\nu^\lambda \quad (29)$$

where λ there is thmpirychnym coefficientitsiyentom moDPOvidnosti. Pidstavyvshy informulasin (22) we obtain:

$$\sigma_\alpha = \Theta_\nu^{\lambda+1}\sigma_w + \sigma_S \quad (30)$$

Substituting (23) in equation (30) we get:

$$\sigma_\alpha = (A\sqrt{\varepsilon_r} + B)\Theta^{\lambda+1}\sigma_w + \sigma_S \quad (31)$$

where the dielectric transfer coefficient is assumes the form:

$$T_d = (A\sqrt{\varepsilon_r} + B)^{\lambda+1} \quad (32)$$

Pidstavyvshy formula (20) in equation (31) and solutions for σ_w new model determining conductivity obtained in terms ε_r and ε_i: $\sigma_w = ($

$$\varepsilon_i 2\pi f \varepsilon_0 - \sigma_s) / (A \quad \varepsilon_r + B)^{\lambda+1} \qquad (32)$$

where $\varepsilon_i 2\pi f \varepsilon_0 = \sigma_d$ Wormsand equivalent to □□ (S / m).

Formula (32) diandsleep value dlI bud 'of a $\varepsilon_r \geq \varepsilon_s$, $(\varepsilon_i 2\pi f \varepsilon_0 - \sigma_s) \geq 0$ and $(A\sqrt{\varepsilon_r} + B)^{\lambda+1} \succ 0$.

Conclusion. Youmanuf two models to determine the conductive properties of the soil environment based on existing methods for determining the conductive properties that will improve the precision of the results, and consequently increase the efficiency and quality of manufacturing operations.

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In Article pryvedennыe Theoretical PRINT descriptions эlektroprovodnыh properties hruntovoy environment poluchennыh putem MONITORING STATUS selskohozyaystvennыh Agreement and removed for эmpyrycheskaya dependence to Increase accuracy poluchennыh results.

Thenchnoe zemledelye, MONITORING, эlektroprovodnыe properties, hruntovaya Wednesday.

In paper the resulted theoretical bases for description of electrical properties of ground environment of agricultural lands got by monitoring of state and empiric dependences are shown out for increase of exactness of got results.

Precision agriculture, monitoring, conductive properties, soil ground.

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STATUS AND PROSPECTS OF SUPPORT dairy cattle Kyiv Oblast for cooking and distribution FEED

AV Nowicki, Ph.D.

The paper analyzes the technical provision of animal husbandry facilities for preparation and distribution of feed. Formed prerequisites for the development of the domestic market for cooking and distribution of feed.

Mato a means for making and distribution of feed, livestock, dairy cattle.