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Abstract.*Sostavleno analytycheskuyu model sferycheskyh installation disk in the Cartesian coordinate system with motion prynyatым unit vdol axis OY. For zadannым Size uhlam disk and roll attack and is determined Pos s s band obrabotannoy soil. In accordance with the requirements of ahrotehnycheskymy opredelyayutsya uhlы installation and sharpening disk.*

Keywords: sferycheskyy soil-cultivating disk unit movement direction, equation surface drive installation uhlы

Annotation.*It is made analytical model of installation of spherical disks in Cartesian coordinate system with the set movement of the unit along axis OY. On the set sizes of disks and angles of attack and rolls their position and a band of the cultivated soil is defined. According to agrotechnical requirements angles of installation and sharpening of disks are defined.*

Key words: spherical soil disc, direction of movement of unit, equation disk surface, corners of installation
UDC 621.436: 534

THEORETICAL SPECTRA OF SIGNAL CHU AND THEIR RELATIONSHIP WITH THE DURATION OF STRIKES

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Abstract.*Considered a classic and modern approaches to strikes in CHU diesel engines. The dependence of the width of the spectrum to determine the duration of collisions details. For modeling used mathematical package Mathcad 15.*

Keywords: shot, spectrum, amplitude, energy balance, plastic deformation, ultrasound

Formulation of the problem. Mechanical shock called a phenomenon that occurs in the collision of two bodies while accompanied by a complete or partial transfer of kinetic energy in the

body deformation energy [1]. The components are impact strength and movement. The nature of the same effects largely depends on the formation of an effort in this kinematic pair and determined rigidity body that spivudaryayutsya. The load is estimated to exceed 10, 100 or even a thousand times, and mechanisms while significantly faster wear [1]. The balance of power, which complies with classical mechanics (body after impact may have only two types of energy - kinetic and energy of plastic deformation when they occur. Another difference in the formulas of the classical theory of impact is no indicator of time. In addition, by using these formulas can not calculate the force of impact, tension in the bodies that spivudaryayutsya, their displacement and acceleration. to determine is the optimal frequency of diagnostic range should be the value duration spivudaru piston against the sleeve. Therefore, the definition of these parameters can be provided combining methods of classical mechanics strike with elements of elasticity.

Analysis of recent research. Analyzing the expression balance of power at impact (Table. 1), we can conclude that the main difference between modern ideas concerning energy balance upon impact, in contrast to classical mechanics is idea of being in a body after impact, along with the kinetic and potential energy, while the classical theory does not account for this possibility.

The simultaneous existence of a body of potential and kinetic energy after the collision is possible because the tension and

deformation of the point of contact spread through the body is not instantaneous, but with some finite speed - speed of wave propagation. In this connection, the part of the body is already covered by a wave of tension has potential energy, and the part which the wave intensity has not yet reached retains the initial kinetic energy.

1. Laws balance of power at impact.

Classical impact theory				
The nature of the shock interaction	Reduction factor	to strike	During the strike	After impact
Elastic	k = 1	A0	Ak + Ap	A1
Elastic (not very elastic)	0 <k <1	A0	Ak + Ap + P	A1 + P
Plastic	k = 0	A0	Ak + Ap + P	A1 + P
Contemporary representation theory of impact				
The nature of the shock interaction		to strike	During the strike	After impact
Elastic		A0	Ak + Ap	A1
Elastic		A0	Ak + Ap	A1 + A1r
Elastic		A0	Ak + Ap + P	A1 + P + A1r
Elastic		A0	Ak + Ap	A1 + A1r
Plastic		A0	Ak + P	A1 + P

In this tab. 1 adopted the following notation: A0 - total kinetic energy of bodies before impact; Ak - the total kinetic energy of the body upon impact; Ap - the total potential energy of the body upon impact; P - energy that is spent on non-mechanical plastic deformation and energy loss; A1 A1r - under the total kinetic and potential energy of bodies after the impact.

Similarly to the end of the strike, when the shock load is removed, part of the body does not have time to get rid of stress, and therefore of potential energy. This part of the potential energy that remains in the body after impact *A1r* and makes the following expression for the energy balance of a real elastic impact [1]

$$A_0 = A_1 + A_{1p}, \quad (1)$$

instead:

$$A_0 = A_1, \quad (2)$$

Results. Imagination stroke movement is usually associated with the interaction of a single body, accompanied by the release of significant amounts of energy in a small space [2]. At the same time believe that the least period of natural oscillations of equal or greater length shock interaction. However, this approach to some extent reduces the possibility of a general analysis and prevent the use for this purpose uniform ratios as short concept is conditional. So in this article we will understand during every interaction shock acyclic deterministic process with a distinct beginning. This meant that before the shock process, ie at $t \le 0$, A physical quantity that characterizes the movement, zero or zero can be equated, by appropriate transfer of coordinate system. Otherwise the movement should be seen as a pulsed vibration to which these methods can not be used.

To the shock of movement and related periodic pulsed nature of the processes in the case where the time of occurrence of the next pulse system, which has hit, returns to its original state.

The wave speed is determined only material properties of bodies taking part in the strike. This last several orders of magnitude greater than the rate of displacement of the particles of these bodies. Also different frequencies and wave oscillation frequency of vibrations of the particles of bodies, longitudinal, torsional and others.

In consideration of vibroacoustic diagnostics, we are confronted with the phenomenon of stress wave propagation in collisions in the kinematic pairs and thus must take into account patterns of exchange of energy at spivudari details. Time blow while playing an important role. During kick taken time during which the tension is kept in contact details.

For a natural time unit that measures the duration of impact, taken

during the slowest oscillation of the body. Time little impact depends on the initial velocity of the body and grows with increasing mass of bodies that spivudaryayutsya and malleability (plasticity) point of contact. Dependence, which represents the known solutions contact problem of elasticity (formula Hertz) [1] is:

$$F_y = k_1 \cdot \alpha^{\frac{3}{2}}, \quad (3)$$

where: k1 - coefficient of proportionality; α - The value of compression (convergence).

In our case, when contacted two hemispheres (piston and cylinder) with masses M1 and M2 with an initial velocity v0, then:

$$k_1 = \frac{4}{3 \cdot \left[\frac{1-\mu_1^2}{E_1} + \frac{1-\mu_2^2}{E_2} \right] \cdot \sqrt{\frac{1}{R_1} + \frac{1}{R_2}}}, \quad (4)$$

where: μ_1, μ_2 - Poisson; E1, E2 - modulus of elasticity of the material bodies; R1, R2 - radius include contact end surfaces.

During the production, recovery, assembly and operation details form surfaces that contact may be different from the set. By weakening landing clearances and increased detail in relative motion are more degrees of freedom and their contact takes place at several points (double whammy). The nature of momentum and its spectrum with the changes [2].

The main types of oscillatory movements when using the machine caused friction bearings, hydraulic fluctuations in lubricants, fuel, hydraulic and cooling systems of the engine, accompanied by a noise pulse, shock, provoked by relaying details in gaps precession, and with the introduction of additional degrees of freedom after operation .

At the stroke of the rod is a geometric dispersion essence of which is the dependence of the phase velocity of the wave length of af λ_1 It means reducing the velocity of vibrations with greater frequency (high harmonic). As a result, as the passage of impulses along the rod at the end of short duration expand.

If the wavelength $\lambda_1 = a_{\Pi} \cdot t_{ud} < 2L$ Where L - length of the rod; AP - velocity of longitudinal waves; tud - duration of the strike, the curve shift rod ends has a stepped character and appearance of the curve acceleration damped series of pulses. If $t_{ud} > 2L / a_{\Pi}$, The individual pulses merge into a periodic signal of complex shape. Minimum signal which can be distinguished by dependence:

$$t_{min} \approx 6.9 \cdot \frac{r_1}{a_п} + 0.014 \cdot \frac{L}{a_п}, \quad (5)$$

where: r1 - radius rod.

For cylindrical surfaces where the contact zone is a line of convergence is given by:

$$\alpha = \frac{1}{2} \cdot \left(\frac{1-\mu_1^{\,2}}{E_1} + \frac{1-\mu_2^{\,2}}{E_2} \right) \cdot ln \frac{4}{b_k} \cdot \frac{F_y}{L}, \quad (6)$$

where: bk - width of contact area.

For convex-concave surfaces, which is a piston sleeve and the width of the contact area bk determine the relationship:

$$b_k = 2\sqrt{\frac{F_y}{2.71 \cdot L} \cdot \left(\frac{1-\mu_1^{\,2}}{E_1} + \frac{1-\mu_2^{\,2}}{E_2} \right) \cdot \frac{R_1 \cdot R_2}{R_1 - R_2}}, \quad (7)$$

In this part of the kinetic energy of the body, which spivudaryayetsya goes into potential energy of elastic compression *Ap* [1].

$$A_p = \int_0^{\alpha_{max}} k_1 \cdot \alpha^{\frac{3}{2}} d\alpha = \frac{2}{5} \cdot k_1 \alpha_{max}^{\frac{5}{2}}, \quad (8)$$

At maximum compression bodies we find the relationship:

$$\alpha_{max} = \left(\frac{5}{2} \cdot \frac{A_p}{k_1} \right)^{\frac{2}{5}} = \left[\frac{5}{2} \cdot \frac{v_0^{\,2} \cdot M_1 \cdot M_2}{k_1 \cdot (M_1 + M_2)} \right]^{\frac{2}{5}}, \quad (9)$$

And accordingly the maximum impact force:

$$F_{y_{max}} = k_1 \cdot \alpha_{max}^{\frac{3}{2}} = \left[\frac{5}{2} \cdot \frac{k_1 \cdot v_0^{\,2} \cdot M_1 \cdot M_2}{M_1 + M_2} \right]^{\frac{3}{5}}, \quad (10)$$

Dependence to determine the duration of impact, taking into account the above, will look like:

$$t_{ud} = \frac{2\sqrt{A_p}}{v_0} \cdot \int_0^{\alpha_{max}} \frac{d\alpha}{\sqrt{A_p - \int_0^{\alpha} k_1 \cdot \alpha^{\frac{3}{2}} d\alpha}} = \frac{2}{v_0} \cdot \int_0^{\alpha_{max}} \frac{d\alpha}{\sqrt{1 - \frac{2}{5} \frac{k_1}{A_p} \alpha^{\frac{5}{2}}}}, \quad (11)$$

Dividing the numerator and denominator of the expression for α_{max} and entering while supporting variable $z = \alpha / \alpha_{max}$ and replacing border integration we get:

$$t_{ud} = 4.2 \cdot \left(\frac{M_1 \cdot M_2}{(M_1 + M_2) \cdot k_1} \right)^{\frac{1}{5}} \cdot \frac{1}{v_0^{\frac{1}{5}}}, \quad (12)$$

Duration blow tud interest to us in terms of its connection of signal. As we know from the literature [2, 3], the time change impact of two bodies affects the width of the spectrum. With decreasing its width range increases and vice versa. As can be seen from the formula (12) for the duration of the strike significantly affect the elastic properties of material bodies, radius and mass of details and does not significantly speed.

For details similar couples can take immutability elastic properties, ie, μ_{and} and EI is const. However, if you hold a measurement of signal when designing a particular resource, you will notice a change in the signal. As a result of changing radius wear parts supply slightly, increasing gaps, and therefore the path that is part for the same period of time and speed spivudaru. All this leads to a reduction in the duration of impact, which is one of the signs of changes in the technical condition of steam. One of the important issues in vibroacoustic diagnosis is a matter of choice informative band of the signal and its regulation. The best is the range in which the slightest change in structural parameters correspond to the diagnostic change. It is not necessary that this range was located in the zone of maximum energy signal zone resonance.

Vibration signal perceived vibration sensor, is modulated in amplitude poliharmoniynyy signal. Its amplitude is proportional to the amplitude shock pulse of acoustic inlet channel. Each component has a harmonic frequency modulation, which is determined by the width of the respective strip transparent filter, and carrier frequency, which is equal to the average frequency bands of the same transparency [3, 4, 5]

Study, found that natural oscillations vibroacoustic channel most strongly manifested in the range of 2 to 10 kHz. However, analyzing the chart of possible stroke engine SMD-31A should be noted that the shock pulse 3rd cylinder piston caused relaying signal superimposed closing the exhaust valve of 4th cylinder and vice versa. Similar obstacles are present for other cylinders. Obviously, the total match points in the obstacle collisions may be significant, and the ratio of signal to noise is too small. In connection with the latter can be concluded inability to provide sufficient resolution capacityDespite significant fluctuations in energy vibrating core.

At low frequencies the active strip at high resonance quality factor of the channel is too large fluctuations in the installation, which does not allocate a pure and divide impulses. Spivudary engine small in duration, than is caused by a wide range (150 kHz) vibration response. If the gap decreases spivudaryan duration, which increases the intensity of high-frequency components of the spectrum.

The above provisions lead to the conclusion that the task of selecting the frequency range is possible in the higher frequencies that are not associated with the detected active strip vibrokanalu. It is helpful

to use ultrasonic frequency range beyond the resonance region, where the range is relatively solid. Arguments of this view is the fact that there is no any distortion that is inherent structural resonance, giving the opportunity to get a true understanding of the forces and their modulation. Consequently, all types of faults can be presented in the form of quantitative indicators as "modulation" (the difference between the level of harmonic vibration and noise level distribution) and a harmonic amplitude spectrum. To confirm the existence of a spivudariv zarezonansniy zone ultrasonic range were conducted theoretical calculations of the spectrum width by length spivudaryan.

To calculate the width of the range defined length collisions details CHU, based on the speed at impact. These calculations are shown in Fig. 1.

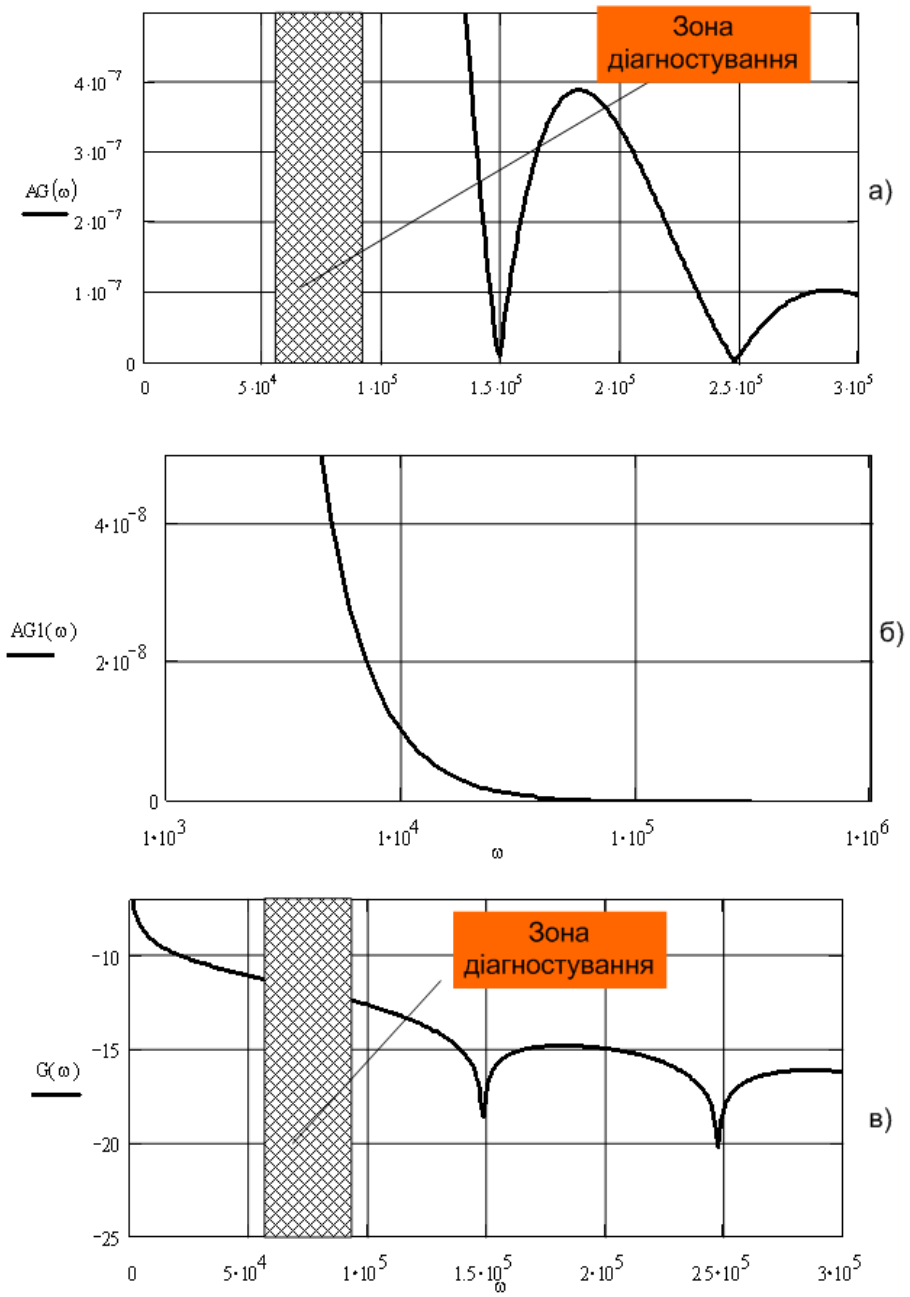

Fig. Image 1. Depending theoretical spectra: a - amplitude; b - power process; in - logarithmic.

Given that diagnosis runs at a frequency of 1000 min-1, this corresponds to the rate of 0.37 to 0.67 m / s, which is equivalent to the duration of collisions from 8.25 × 10-5 to 7.25 × 10-5 has been calculated theoretical spectrum amplitude AG (ω) - (A) the power spectrum process AG1 (ω) - (B) and logarithmic G (ω) - (C) dependency 2.94 and 2.95 (Fig. 1).

Fig. 1 shows that in some sense frequencies ω (1.5 × 105 Hz) pulse range close to zero. We will consider such frequency range for the upper limit ω_{in}. With a frequency higher than the last level of the amplitude

spectrum increases, and then close to zero, and this pattern is repeated. The character shape calculated theoretical spectra coincides with the theory set forth above.

Conclusion. Diagnosis on the edge of the upper border of the spectrum in zarezonansniy field of ultrasonic range outside resonance, where the range is relatively solid, allowed to increase the ratio "signal - barrier", while in the case of switching to another brand engine can avoid the spectral analysis of these options, which to some extent is a measure of the versatility of this method.

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Abstract.*Rassmotrenы klassycheskyy and its contemporary approaches for shock at the CHU diesel. Opredelenы dependence for definitions shyrynы spectrum, such durations soudarenyya details. For modeling yspolzovalsya mathematical package MathCad 15.*

Keywords: blow spectrum amplitudes, energy balance, plastycheskye deformation, ultrasound

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Key words: beat spectrum, amplitudes, energy balance, plastyc deformation, ultrasound

UDC 631.31: 634

STUDY OF parameters of cylindrical brushes RESISTANCE TO EFFECTIVE SOIL AND REACTION ground base The disclosure of the root system of mother plants

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