usually take less than the average value of the standard deviation $\sigma t_н$. In this case, only 15-16% of the cars will undergo maintenance after the deadlines, the interval for maintenance will be big enough, so it will remain precautionary. If we take $t_н = t_н^c$, The maintenance may be too late, since half of all cars in this period reached the limit state for the parameter in question. The structure of the maintenance work (Fig. 3), their sequencing and frequency are as follows (for brevity TP1 is replaced by the symbol 1, symbol of TP2 by 2; symbol TP3 by 3).

Conclusions. The current national standard is permitted to set maintenance intervals for other units - in kilograms (tonnes) or liters of fuel used in the conventional reference acres developments. The frequency of maintenance of machines for forestry work and their contents are specified in the accompanying technical documentation (operating instructions). The units of frequency measurement here can be used volumes treated area, hours worked, hours or volume of products obtained.

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Abstract.*The article presents the results of analytical studies analyzing the frequency of maintenance machines for Forestry work.*

Keywords:*rejection, frequency, forestry machine*

Abstract. In Article predstavlenы Analytical results of research of technical analysis peryodychnosty of service machines lesotehnycheskyh works.

Keywords: refusal, peryodychnost, Lesnaya machine

UDC 531.32

MECHANICS OF PARTICLE MOTION IN radial blade rotating drum

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Abstract. Specified mathematical model to determine the parameters of movement of material particles in the radial blade in different variants drum.

Keywords: drum, radial blade, the movement of particles

Formulation of the problem. Improving the efficiency of the devices for mixing substrates based on rotating drums is becoming more common in biotechnological fermentation process biological waste into biogas plants with rotating reactors [1-4], so justification methods for determining the parameters of particle motion in the radial blade in a rotating drum that will install rational values of angular velocity and the design parameters rotating drum needs further improvement.

Analysis of recent research. Fundamentals of Mechanical movement of material particles on the working bodies of the horizontal and vertical axis of rotation were established in the famous work of academician P. Vasilenko [5]. A significant amount of research to determine the relative speed of movement of a point on the working bodies of the horizontal axis of rotation was conducted in [6-8] to determine the parameters of working for loosening composts and organic fertilizers. Also investigated the movement of the fingers ripping compost drum with peripheral load [9-13]. In most of these studies concerned the definition of the mechanics of movement of material particles on radial working bodies in a limited sector of rotation of the drum. Dla synthesis of the research it is advisable to define the basic equation describe the mechanics of the movement of material particles on radial blades rotating drum and conduct analysis.

The purpose of research. Determine the generalized differential equation which describes the motion of material particles in the radial blade drum rotating at different rotation directions and frames of reference rotation angle from horizontal and vertical axis of the drum.

Results. Diagram of the forces of the material particles move in radial centrifugal blades in a rotating drum and for each quadrant in its rotation against clockwise and shown in Fig. 1 and Fig. 2 (reference frame rotation angle from the horizontal axis).

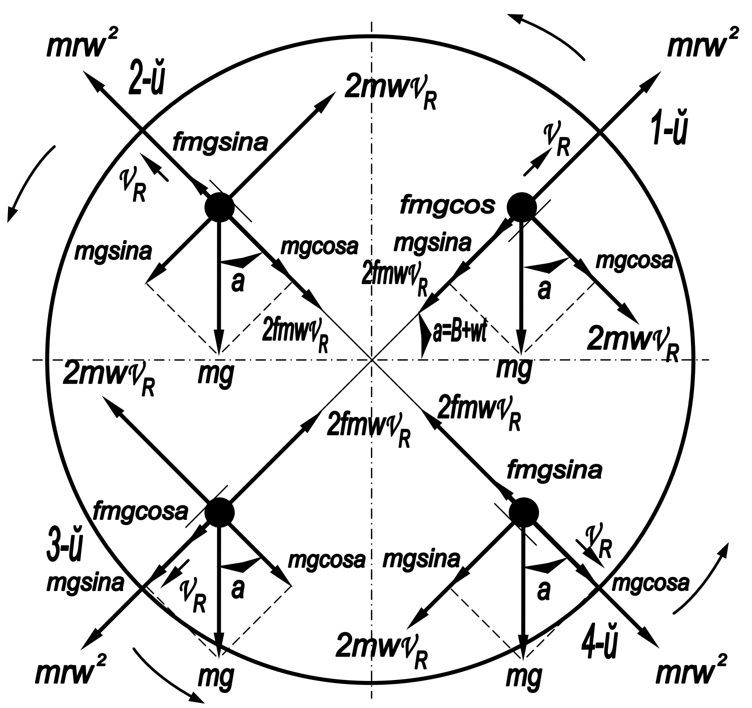

Fig. 1. Scheme of the forces on a particle moving centrifugal drum while rotating counterclockwise and by reference rotation angle from the horizontal axis.

According schemes resulted centrifugal motion on the radial mixing blades in a rotating drum, a piece of the material, the following forces: gravity, Coriolis force, the friction force of the action of gravity and Coriolis force and the centrifugal force of inertia.

When centrifugal particle motion and rotation of the drum counterclockwise, as well as frame rotation angle from horizontal axle, differential equations of motion of particles in pan for each quadrant will be written in the following form:

$$1-й \text{ квадрант} - \text{кут повороту } (B+wt) = 0 + (B+wt):$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\cos(B+wt) - mg\sin(B+wt); \quad (1)$$

$$2-й \text{ квадрант} - \text{кут повороту } (B+wt) = 90 + (B+wt):$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\sin(B+wt) - mg\cos(B+wt); \quad (2)$$

$$3-й \text{ квадрант} - \text{кут повороту } (B+wt) = 180 + (B+wt):$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\cos(B+wt) + mg\sin(B+wt); \quad (3)$$

$$4-й \text{ квадрант} - \text{кут повороту } (B+wt) = 270 + (B+wt):$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\sin(B+wt) + mg\cos(B+wt), \quad (4)$$

where: m - particle mass, kg; ω - angular velocity of the drum rad / s; r - the radius of the current position of a particle in a pan, m; g - acceleration of gravity, m / s2; f - friction material particles on the blade material, ratio. ed .; - The initial angle of the blade drum councils .; t - time rotation of the drum, c; υR - minimum relative velocity of the particles in a pan, m / s.

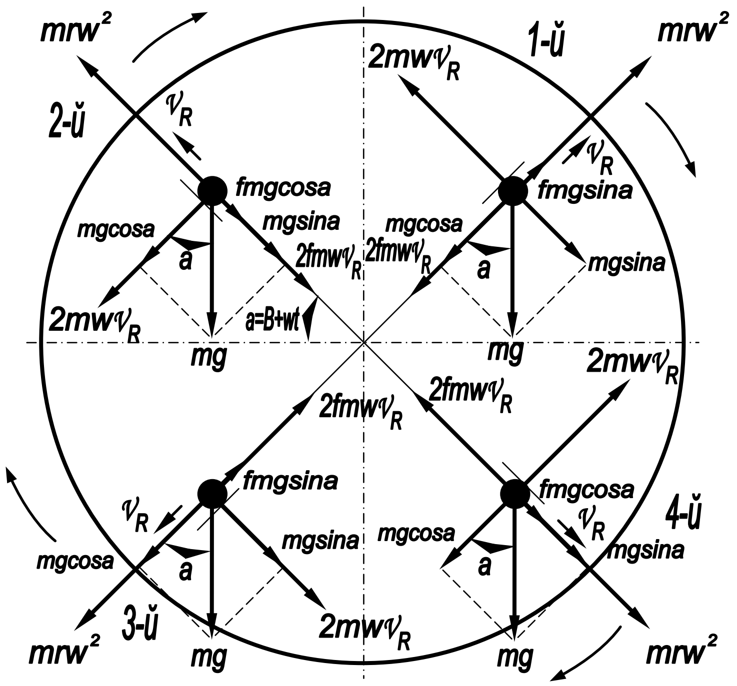

Fig. 2. Scheme of the forces on a particle moving centrifugal drum while rotating clockwise and by reference rotation angle from the horizontal axis.

Given the known trigonometric dependence, namely:

$$\sin(90+\alpha)=\cos\alpha;\ \cos(90+\alpha)=-\sin\alpha\,; \tag{5}$$

$$\sin(180+\alpha)=-\sin\alpha;\ \cos(180+\alpha)=-\cos\alpha\,; \tag{6}$$

$$\sin(270+\alpha)=-\cos\alpha;\ \cos(270+\alpha)=\sin\alpha\,, \tag{7}$$

You can, for example, the first equation to substitute the angle of rotation of the blade and get the appropriate quadrant for the differential equation.

When the centrifugal movement of particles and drum rotation clockwise, as well as frame rotation angle from horizontal axle, differential equations of motion of particles in pan for each quadrant will be written in the following form:

$$2-й\ \text{квадрант} - \text{кут повороту}\ (B+wt)=0+(B+wt)$$

$$m\frac{dv_R}{dt}=m\frac{d^2r}{dt^2}=mrw^2-2\,fmw\frac{dr}{dt}-\ fmg\cos(B+wt)-mg\sin(B+wt); \tag{8}$$

$$1 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 90 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\sin(B + wt) - mg\cos(B + wt); \quad (9)$$

$$4 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 180 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\cos(B + wt) + mg\sin(B + wt); \quad (10)$$

$$3 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 270 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\sin(B + wt) + mg\cos(B + wt). \quad (11)$$

Given the known trigonometric relationship (5) - (7) can also, for example, the first equation to substitute the angle of rotation of the blade and get the appropriate quadrant for the differential equation. Thus we see that the centrifugal movement of particles in a pan and drum rotation against clockwise and, as well asframe rotation angle from horizontal axle, differential equations of motion of a particle on the blade offset identical to one quadrant.

A similar design scheme of the forces of the material particles move in radial centrifugal stirring blades in a rotating drum and for each quadrant in its rotation and against clockwise, but the frame of reference rotation angle from the vertical axis is shown in Fig. 3 and Fig. 4.

When the centrifugal movement of particles and drum rotation clockwise, as well as frame rotation angle from the vertical axis, differential equations of motion of particles in pan for each quadrant will be written in the following form:

$$1 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 0 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\sin(B + wt) - mg\cos(B + wt); \quad (12)$$

$$4 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 90 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\cos(B + wt) + mg\sin(B + wt); \quad (13)$$

$$3 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 180 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\sin(B + wt) + mg\cos(B + wt); \quad (14)$$

$$2 - й\ \text{квадрант} - \text{кут повороту}\ (B + wt) = 270 + (B + wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\cos(B + wt) - mg\sin(B + wt). \quad (15)$$

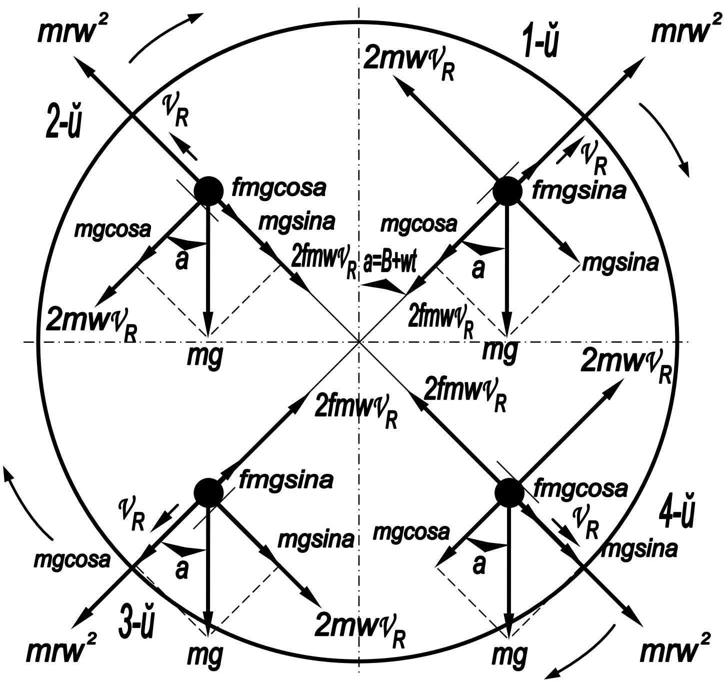

Fig. 3. Scheme of the forces on a particle moving centrifugal drum while rotating clockwise and by reference rotation angle from the vertical axis.

Get relevant for each quadrant of differential equations are also given the known trigonometric relationship (5) - (7).

When centrifugal particle motion and rotation of the drum counterclockwise, as well as frame rotation angle from the vertical axis, differential equations of motion of particles in pan for each quadrant will be written in the following form:

$$2-й \text{ квадрант} - \text{кут повороту } (B+wt) = 0 + (B+wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\sin(B+wt) - mg\cos(B+wt); \tag{16}$$

$$3-й \text{ квадрант} - \text{кут повороту } (B+wt) = 90 + (B+wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\cos(B+wt) + mg\sin(B+wt); \tag{17}$$

$$4-й \text{ квадрант} - \text{кут повороту } (B+wt) = 180 + (B+wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\sin(B+wt) + mg\cos(B+wt); \tag{18}$$

$$1-й \text{ квадрант} - \text{кут повороту } (B+wt) = 270 + (B+wt)$$

$$m\frac{dv_R}{dt} = m\frac{d^2r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} - fmg\cos(B+wt) - mg\sin(B+wt). \tag{19}$$

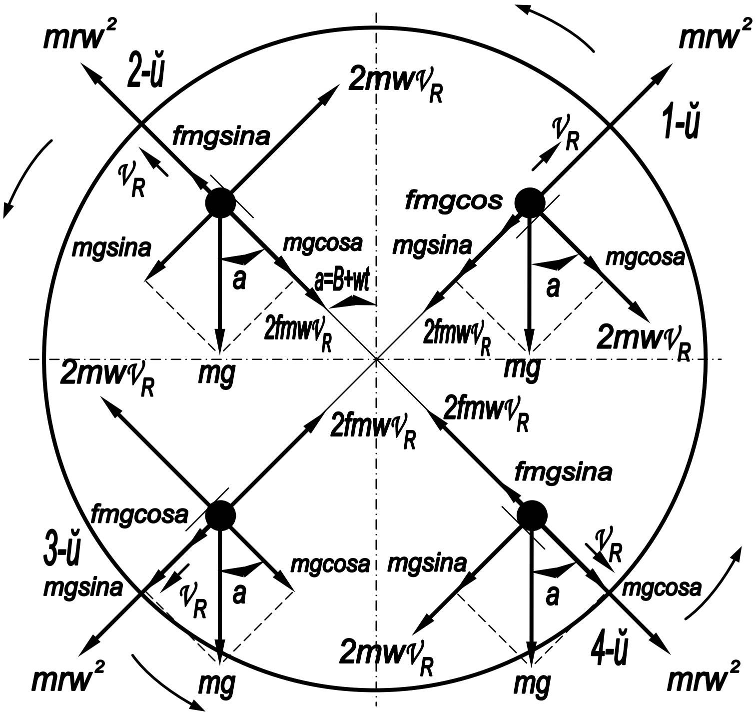

Fig. 4. Scheme of the forces on a particle moving centrifugal drum while rotating counterclockwise and by reference rotation angle from the vertical axis.

Dependencies (5) - (7) also allow for substitution of the angle of rotation of the blade to get the appropriate quadrant of differential equations.

Thus we see that the centrifugal movement of particles in a pan and drum rotation against clockwise and, as well as frame rotation angle from the vertical axis, differential equations of motion of a particle on the blade as identical as in the first case, offset to one quadrant.

Consider also the diagram of the forces of the material particles move along centripetal radial blades in a rotating drum for each quadrant, and when it is rotating counterclockwise (Fig. 5) in the case of the reference rotation angle from the horizontal axis. We write the differential equation for example centripetal motion of particles in pan for the first quadrant:

$$-m\frac{dv_R}{dt} = -m\frac{d^2 r}{dt^2} = mrw^2 - 2fmw\frac{dr}{dt} + fmg\cos(B+wt) - mg\sin(B+wt), \quad (20)$$

or

$$-m\frac{dv_R}{dt} = -m\frac{d^2 r}{dt^2} = \left(mrw^2 - mg\sin(B+wt)\right) - f\left(2mw\frac{dr}{dt} - mg\cos(B+wt)\right), \quad (22)$$

and compare it with the differential equation (1) centrifugal movement of particles on the pan for the first quadrant and rotating drum and counterclockwise and in frame rotation angle from the horizontal axis (Figure 1), which is reduced to the form:

$$m\frac{dv_R}{dt}=m\frac{d^2r}{dt^2}=\left(mrw^2-mg\sin(B+wt)\right)-f\left(2mw\frac{dr}{dt}+mg\cos(B+wt)\right). \quad (23)$$

With the general form of equations (22) and (23) we can conclude that the differential equation and centripetal centrifugal movement of particles identical to pan and reduce to one type by changing the signs (directions of the forces) forces of inertia and friction forces from the effects of gravity. The sign resultant forces mrw^2 and $mg\sin(B+wt)$ determined by their absolute value, and Mr.apryamok koriolisovloyi force - a sign value $\frac{dr}{dt}$.

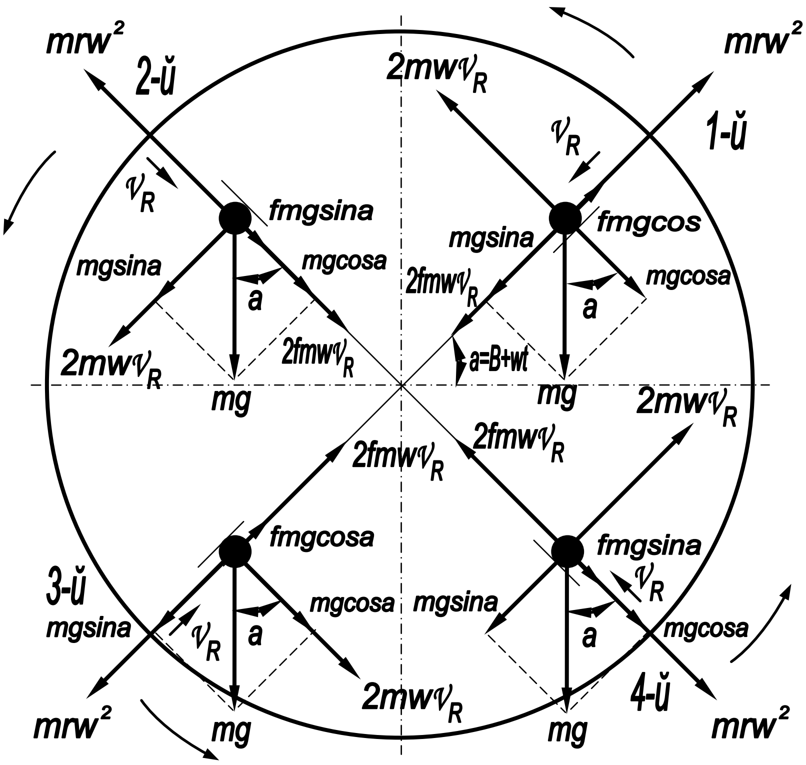

Fig. 5. Scheme of the forces on a particle moving centrifugal drum during rotation and counterclockwise rotation angle with reference to the horizontal axis.

Conclusion. Differential equations with centrifugal particle motion in a pan and rotate the drum against, and clockwise and at frame rotation angle from the vertical axis identical differential equation of centrifugal movement of particles in pan and rotating the drum against, and clockwise in the system reference rotation angle from the horizontal axis offset for each quadrant. Differential equations of motion of a particle on radial blades under centrifugal movement and rotation of the drum counterclockwise in the frame rotation angle of the vertical axis are identical differential equation of motion of a particle on radial blades under centrifugal movement and rotation of the drum counterclockwise in the frame rotation angle of the horizontal axis. Differential equations of motion of a particle on radial blades drum with centripetal motion are identical differential equation of motion of a particle on radial blades under centrifugal motion.

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Abstract.*Refined matematycheskaya model for determining parameters for centrifugal movement of particles in materyalnыh radyalnoy Blades at DIFFERENT variants rotation of the drum.*

Keywords: drum, radyalnaya shovel, particle motion

Annotation.*The mathematical model to determine the parameters*

of the centrifugal movement of material particles on radial blade variants with different drum is specified.
Key words: drum, radial blade, the movement of particles

UDC 631,171, 631.35

STRATEGIC POLICY IN PROVIDING TECHNICAL ASSEMBLY IN UKRAINE domestic bread combine harvesters

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Nature Ukraine
VI Nyedovyesov, Ph.D.
National Scientific Center "Institute of mechanization and electrification of agriculture"

Abstract. *The state and the major problems in collecting food and offered to domestic kombaynobudivnytstva major structural and technological characteristics of promising basic models of combine harvesters low, medium, high and very high performance with bandwidth respectively: 1.5-3 kg / s; 3-6 kg / s; 6-15 kg / s; 15-25 kg / s technological material.*
Keywords: grain harvester, strategy

Formulation of the problem. Characteristic of grain production is that the harvesting of grain crops remains the costliest manufacturing operations in the crops in any country, but with the collection nezernovoyi of harvest costs money, labor and energy twice or more times the cost of implementation of all other operations associated with the production of grain. And that's not all.

Grain production in the world was not only expensive, but also fundamentally perverse, because based primarily on excessive use of limited available natural resources (ferrous and nonferrous metals, energy and lubricants and oily material of oil origin gas energy, coal, chemicals , humus soil, fertilizer, fresh water, polymers, rubber and paint, pesticide, production of which is not only costly but also hazardous to human health, labor, etc.). At the same time almost every state considered strategic food grain raw material production associated with yakoyu basic foods people and economy of agriculture and food industry. This contradiction in the production of food is a sign of a new global