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INVESTIGATION OF VERTICAL FORCED VIBRATION IN THE LONGITUDINAL - VERTICAL PLANE OF A BINDER THAT SOFTENS THE CRUSH BETWEEN COTTON ROWS

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Abstract: The forces acting on the bobbin due to moisture, density, and hardness of the tangle formed between rows of cotton were studied. Roll on in the longitudinal - vertical plane, in addition to the forward motion, the aggregate of the blade performs a forced oscillating motion in the vertical direction. Forced vibration motion of the roller in the vertical direction was studied. It was found that the force was linearly dependent on the amount and speed of the deformation of the coil under the influence of rolling. The sum of the forces arising from the variation of the physico-mechanical properties of the concrete was found.[1] It can be seen from the analysis that, for the given working conditions, the quality of the smoothing of the roller by the roller was achieved due to its total mass, that is, the parallelogram mechanism and the joint mass, the uniformity of the pressure spring, and the correct choice of the angle of deviation from the horizon during the operation of the parallelogram mechanism's longitudinal pullers.[2]

Keywords: friction, moisture, density, rolling, softening of friction, rolling stock, oscillatory motion, differential equation, parallelogram, hinge, deformation, static, coefficient.

Introduction. It is known that in the conditions of Bukhara region, it is possible to save the newly sprouted cotton seedlings by softening the slush that occurs due to rainfall after the germination of cotton, by working between the rows. By loosening the thicket, favorable conditions are created for the growth of cotton, it is possible to reduce the escape of moisture from the soil, improve the air exchange in the soil, improve the assimilation of nutrients and reduce the chances of cotton disease.[3-4]

Forces N_z acting on the reel N_x are constantly changing. Because of this, there is no reeling in the work process in the longitudinal - vertical plane, in addition to the forward motion, a forced vibration movement in the vertical direction is performed by the aggregate. Based on this, we will study the forced vibration motion of the roller in the vertical direction. For this purpose, we construct the differential equation of vertical oscillations of the coil using the computational scheme presented in Fig. 1 . It will have the following appearance [3 - 4; p. 24]

$$m\frac{d^2Z}{dt^2} = mg + Q_n - N_z(1+\mu tg\alpha), \quad (1)$$

where Z is the vertical coordinate axis passed through movable hinges I and L of the parallelogram mechanism, m;

t – time, s.

in the expression (1.2) as the sum of the forces N_z that are linearly dependent on the amount and speed of the deformation of the fabric under the influence of rolling N_d, N_v

and which arise from the variation of the physical and mechanical properties of the fabric N_t [5-6; p. 91], i.e

$$N_z = N_d + N_v + N_t. \tag{2}$$

Taking this into account, the expression (1.1) will have the following form

$$m\frac{d^2Z}{dt^2} = mg + Q_n - (N_d + N_v + N_t)(1 + \mu tg\alpha). \tag{3}$$

When the coil is in static equilibrium

$$N_d = h_t C_t B; \tag{4}$$

$$N_v = 0; \tag{5}$$

$$N_v = 0; \tag{6}$$

$$Q_n = Q_0, \tag{7}$$

in this h_t - the depth of immersion of the roller in the state of equilibrium, m;

in this C_t - the density of the coil, which is brought to the width of one unit covering the roller, Ns/m ².

Q_o – the tension force when the parallelogram mechanism touches the pressure spring in the initial state, i.e., in the static equilibrium state of the roller, N.

Galtakmola from the state of static equilibrium Z to the distance down when moved

$$N_d = h_t C_t B; \tag{8}$$

$$N_v = Zb_t B; \tag{9}$$

$$N_v = -\Delta N_t; \tag{10}$$

$$Q_n = Q_0 - C_p Z, \tag{11}$$

in this b_t - the resistance coefficient of the coil per unit width of the coil, Ns/m ².

N_d, N_v, N_z and Q_n ni (8) – We put the values of expressions (9) into (3):

$$m\frac{d^2Z}{dt^2} = mg + Q_0 - C_p Z - \left[(h_t C_t B + Zb_t B + -\Delta N_t)\right](1 + \mu tg\alpha). \tag{12}$$

When the coil is in static equilibrium

$$mg + Q_0 - h_t C_t B(1 + \mu tg\alpha) = 0. \tag{13}$$

Taking this into account, equation (8) becomes:

$$m\frac{d^2Z}{dt^2} = -C_p Z - (C_t ZB + b_t ZB)(1 + \mu tg\alpha) + \Delta N_t(1 + \mu tg\alpha) \tag{14}$$

$$m\frac{d^2Z}{dt^2}+b_tB\frac{dZ}{dt}(1+\mu tg\alpha)+\left[C_p+C_tB(1+\mu tg\alpha)\right]Z=$$
$$=\Delta N_t(1+\mu tg\alpha). \qquad (15)$$

To solve this expression, ΔN_t we assume that the power changes according to the harmonic law during the work process [5-6; p. 81].

$$\Delta N_t=\sum_{n=1}^{n_1}\Delta N^n\cos\omega t, \qquad (16)$$

in this ΔN^n – the amplitude of alternating ΔN_t power harmonics, N ;

n = 1, 2 , …, n $_1$ – number of harmonics;

n_1 – the last harmonic to be taken into account;

ω – ΔN^n rotational frequency of power change, s $^{-1}$.

(16) into account, (17) has the following form

$$m\frac{d^2Z}{dt^2}+b_tB\frac{dZ}{dt}(1+\mu tg\alpha)+\left[C_p+C_tB(1+\mu tg\alpha)\right]Z=$$
$$=\left(\sum_{n=1}^{n_1}\Delta N^n\cos\omega t\right)(1+\mu tg\alpha). \qquad (18)$$

$$\frac{d^2Z}{dt^2}+\frac{b_tB}{m}\frac{dZ}{dt}(1+\mu tg\alpha)+\frac{\left[C_p+C_tB(1+\mu tg\alpha)\right]}{m}Z=$$
$$=\frac{1}{m}\left(\sum_{n=1}^{n_1}\Delta N^n\cos\omega t\right)(1+\mu tg\alpha). \qquad (19)$$

This equation represents a non-homogeneous second-order differential equation, and its solution representing forced vertical oscillations of the coil has the following form [7-8; p. 54-55].

$$Z(t)=\frac{\sum_{n=1}^{n_1}\left[\Delta N^n\cos(n\omega t-\varepsilon)\right](1+\mu tg\alpha)}{m\sqrt{\left[\frac{c_p+c_tB(1+\mu tg\alpha)}{m}-(n\omega)^2\right]^2+\left[\frac{b_tB(1+\mu tg\alpha)}{m}\right]^2(n\omega)^2}} \qquad (20)$$

in this $\varepsilon=arctg\dfrac{b_tB(1+\mu tg\alpha)(n\omega)^2}{c_p+c_tB(1+\mu tg\alpha)-m(n\omega)^2}$.

According to this expression, the amplitude of forced vertical oscillations of the coil is equal to:

$$A = \frac{\frac{1}{m}\sum_{n=1}^{n_1}\Delta N^n(1+\mu tg\alpha)}{\sqrt{\left[\frac{c_p + c_t B(1+\mu tg\alpha)}{m} - (n\omega)^2\right]^2 + \left[\frac{b_t B(1+\mu tg\alpha)}{m}\right]^2 (n\omega)^2}},$$

(21)

From the analysis of expressions (10) and (11), it can be seen that for the given working conditions, the quality of the smoothing of the roller by the roller is achieved due to its total mass, that is, the mass of the parallelogram mechanism and the gradiil, the uniformity of the pressure spring, the correct choice of the angle of deviation from the horizon during the operation of the parallelogram mechanism's longitudinal pulls. .[9-10-11-12]

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