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Theoretical Analysis of the Vibrations of the Louvered Surface When Cleaning Cotton from Small Impurities

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Annotation: In order to increase the cleaning efficiency of the machine in the equipment for cleaning seeded cotton from small impurities, a blind surface is proposed instead of a mesh surface. When choosing the technological parameters of cleaning cotton from small impurities, the main control developments and calculation processes were considered.

Keywords: cotton, technology, dirt, theory, equation, blind surface, power, virginity, support.

INTRODUCTION

Analysis of the vibration of the louver surface of the cleaner under random forces from the cotton suggested that the support of the louver surface activating the louver surfaces causes additional shaking of the cotton and increased release of mainly small-sized weed mixtures. In order to ensure the desired cleaning effect, it is desirable to justify the parameters of the geometrical and support uniformity of the blind surface.

The main part

It is a study of the vibrations of the surface of the blind when cleaning cotton from small impurities when using materials with different properties. It is known that an increase in the dispersion coefficient leads to a rapid decrease in the vibrations of the blind surface. The laws of vibration behavior are shown when the coefficient of cotton particles changes on the surface of the blinds.

As the dispersion coefficient increases from 12,5 H s/m to 18,5 H s/m, the amplitude of displacement fluctuations decreases from $1{,}13\cdot10^{-3}$ m to $0{,}64\cdot10^{-3}$ m on average, and the amplitude of velocity fluctuations decreases from 1,8 m/s to 0,98 m/s. Acceptable values of the coefficient of spacing of cotton pieces on the surface of the blinds is $\frac{18{,}8-13}{}$ H s/m. at the same time, the vibrations are preserved to a certain extent, which allows to increase the vibration of the cotton and thereby increase the cleaning effect.

In the technological process of cleaning cotton from small impurities, the force of cotton on the surface of the blind is a random function, and its mathematical expectation has a constant value [4].

$$F(t) = \mathrm{Q} + \mathrm{Q}_1 \pm \delta Q \qquad (1)$$

δQ - random component of random force from cotton; Q is the resistive force due to the number of additional grooves.

The numerical solution of the problem was carried out at the following calculated values of the parameters: $m_n = 3.1\cdot10^{-2}$ кг; $Q = 1.2\ H$; $p_o = 216\ c^{-1}$. These calculated parameters are different in the numerical solution of the problem of surface vibrations of the cleaning blind. [5].

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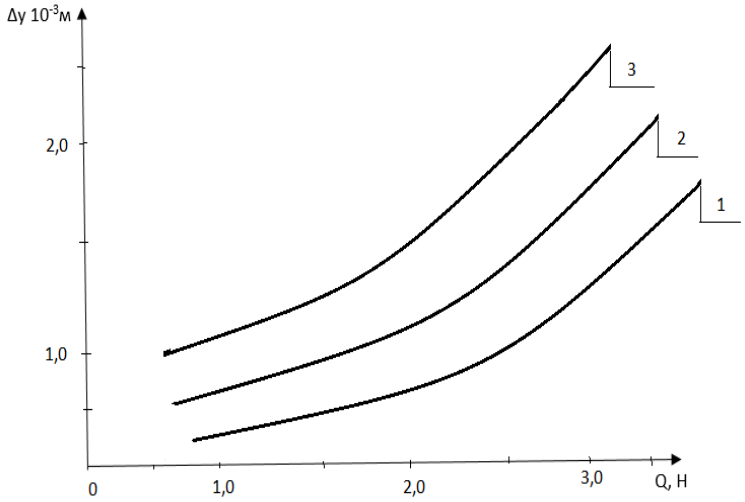
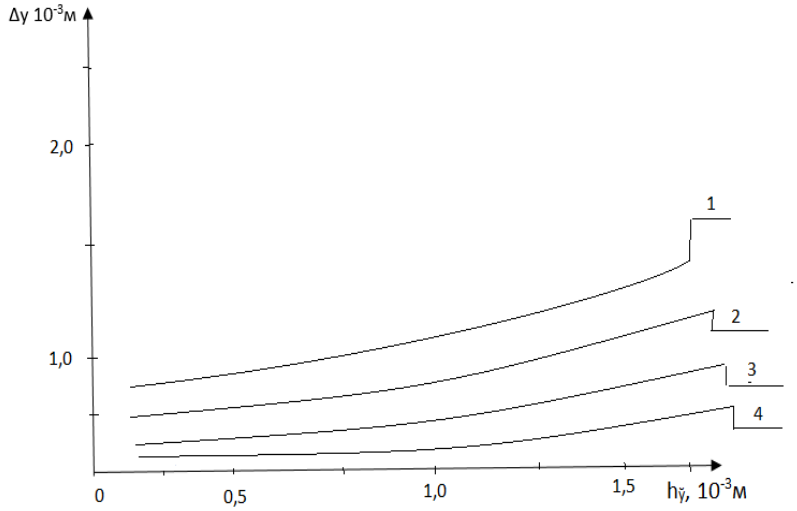
We derive the tension from the constructed connection graphs.



1-$h_{ў}$=0,4*10^{-3}m; 2- $h_{ў}$=0,8*10^{-3}м; 3- $h_{ў}$=1,2*10^{-3}м

Fig. 1 shows graphs of dependence of the vertical vibration coverage of the blind surface on the change of the technological resistance.

This is caused by the vertical vibrations of the cotton pieces carried from the surface of the blinds to the blinds surface. These technological resistance values increase from 0.5H to 3.3H and increase from 0.23*10^{-3}m to 0.92*10^{-3}m in nonlinear connection when the cell thickness is 0.4*10^{-3}m. Correspondingly, the values of the acceleration Q change and the regularity increases when the Q-values decrease from 0.83*10^{-3}m to 2.42*10^{-3}m when h_y =1.2*10^{-3}m. Among the highlights, the vibration coverage is higher, the dirt released from the cotton increases, and the cleaning efficiency increases. But the distance of the slot changes and the fiber damage increases as a result of the impact with the piles. Therefore, it is important to ensure that Q values do not exceed (2.0÷2.5) kg.



1- C=0,8*10^{3}H/m; 2- C=1,2*10^{3}H/m; 3- C=1,6*10^{3}H/m; 4- C=2,0*10^{3}H/m;

Figure 2 presents a graph of the vertical vibration coverage of the modernized belt-supported louvered surface versus the change in resistance due to the grooves in the louvered surface.

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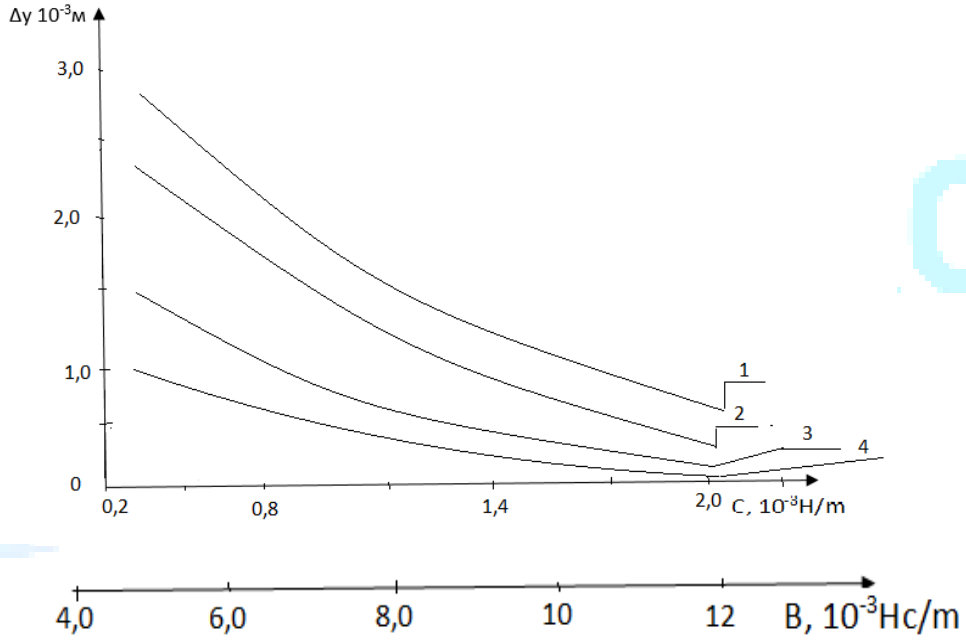
0,8*10^{3}Н/м бўлганида жалузали юза вертикал тебранишлари қамрови 0,19*10^{-3}м дан 0,5*10^{-3}м гача чизиқсиз коэффициентда ортади. Мос равишда таянч бикрлик коэффициенти 2,0*10^{-3} Н/кг қилиб олинганида қийматлари 0,79*10^{-3}м дан 1,17*10^{-3}мгача кўпаяди. Демак, жалузали юза тебранишлари қамрови (1,0÷1,2)*10^{-3} м дан ошмаслиги, тозалаш самараси юқори бўлиши учун жалузали юза ўйиқчалари баландлиги тавсия қийматлари (0,8÷1,2)*10^{-3} м қилиб олиш мақсадга муофиқдир.

The analysis showed that with the increase in the height of the grooves on the blind surface, the movement of the cotton pieces is braked, and the cotton pieces spend more time in the cleaning zone with the pegs and the blind surface, and the cleaning efficiency increases. Here too, damage can increase. The quoted values of ho' increase from 0.25*10^{-3}m to 1.5*10^{-3}m and the range of vertical vibrations of the louvered surface increases from 0.19*10^{-3}m to 0.5*10^{-3} when the base uniformity coefficient is 0.8*103H/m increases in a non-linear coefficient up to -3m. Accordingly, the values increase from 0.79*10^{-3}m to 1.17*10^{-3}m when the base uniformity coefficient is taken as 2.0*10^{-3} H/kg. Therefore, the range of vibrations of the blind surface should not exceed (1.0÷1.2)*10^{-3} m, and the height of the grooves of the blind surface should be (0.8÷1.2)*10^{-3} m for high cleaning efficiency. fit for purpose.



1,2-Δy=f(c); 1,3-Q=2,5H; 3,4- Δy=f(в); 2,4-Q=1,5H;

Figure 3 shows the graphs of the vertical vibration coverage of the louvered surface and the variation of the linear uniformity and dissipation coefficients with strap supports.

According to the analysis of the graphs, it should be noted that the values of the coefficient of uniformity of the belt support of the blind surface range from 0.4*10^3 H/m to 2.0*10^3 H/m, and when the resistance acting on the mesh surface is 2.5H, the Du values are 2.51*10^3 It was found that if it decreases from to 1.1*10^{-3}m in a non-linear pattern, the values of Du decrease to 0.8*10-3m when Q=1.5H. Correspondingly, the values of Du decrease from 1.46*10^{-3} m to 0.32*10^{-3} m in nonlinear coupling when the base dissipation coefficient increases from 5.0H s/m to 12H s/m and the loading is 2.5H. Accordingly, when Q=1.5 H, Du values decrease to 0.17*10^{-3} m. Recommended values for vertical vibration coverage values of the blind surface with grooves to be in the range of (0.8÷1.2)*10^{-3}m S=(1.2÷1.5)*10^3 kg/m; v=(10÷12) kg/ m

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3. Модернизация қилинган қайишқоқ таянчли жалузали юзани вертикал тебраниш қамрови жалузали юзадаги ўйиқчалар ҳисобига тўғри келган қаршиликни ўзгаришига боғлиқлик графиги келтирилган. Бунда жалузали юза тебранишлари қамрови $(1,0\div1,2)*10^{-3}$ м дан ошмаслиги, тозалаш самараси юқори бўлиши учун жалузали юза ўйиқчалари баландлиги тавсия қийматлари $(0,8\div1,2)*10^{-3}$ м қилиб олиш мақсадга муофиқдир.

8. Жалузали юзали вертикал тебраниш қамровини қайишқоқ таянчлар келтирилган чизиқли бикрлик ва диссипация коэффициентларини ўзгаришига боғлиқлик графиклари қурилган. Ўйиқчалари бўлган тўрли юзани вертикал тебраниш қамрови қийматлари $(0,8\div1,2)*10^{-3}$м оралиғида бўлиши учун тавсия қийматлари $C=(1,2\div1,5)*10^{3}$ кг/м; в=(10÷12) кг/ м

Summary

1. Triangular patterns of vibration of the louvered surface of cotton under cyclic loading were obtained. It was found that the maximum displacement of the blind surface with the cleaner t/h operation reaches m per second.

2. Graphs of the dependence of the vertical vibration coverage of the blind surface on the technological resistance change were obtained. It is recommended not to exceed the technological resistance force (2.0÷2.5) H in order to ensure not to increase the damage of fiber and seed.

3. A graph of the dependence of the vertical vibration coverage of the modernized belt-supported louvered surface on the resistance change due to the grooves in the louvered surface is presented. In this case, the range of vibrations of the blind surface should not exceed $(1.0\div1.2)*10^{-3}$ m, and for the cleaning efficiency to be high, the recommended values of the height of the grooves of the blind surface should be $(0.8\div1.2)*10^{-3}$ m is appropriate.

4. Graphs of dependence of the vertical vibration coverage of the louvered surface on the variation of the linear uniformity and dissipation coefficients with strap supports are constructed.

The recommended values for the vertical vibration coverage values of the mesh surface with grooves are in the range of $(0.8\div1.2)*10^{-3}$m $C=(1.2\div1.5)*10^{3}$ kg/m; v=(10÷12) kg/ m

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