Felt, teplofyzycheskye properties, sandwich panels, zhyvotnovodcheskye the premises, temperature, heat transfer.

Result of calculation of thermal properties of some structures of sandwich panels of the building felt the resulting chart of temperature and dew point in its width. On the basis of theoretical investigations of thermal properties of sandwich panels of the building felt it set a rational structure of «OSB (8 mm) - felt (20 mm) - layer (10 mm) - steel (0.5 mm)", which is characterized by resistance to heat transfer and specific heat flow.

Felts, thermal properties, sandwich panels, livestock facilities, temperature, heat transfer.

UDC 677,057,617

Mathematical model of felting GROSS wool felt in Plast ON sized plate-fulling machine

EB Aliev, Ph.D.
NAAS Institute of oilseeds
SI. Pavlenko, PhD
Dnipropetrovsk State Agrarian University of Economics

Based on the conditions intensifying the process of felting wool rough layer in Felt reasonably ryfliv geometric parameters of the working surface of the upper movable plate compact plate-fulling machine. From the condition of maximum area tension action that occurs in a layer of coarse wool during loading geometry set ryfliv working surface of the upper movable plate compact plate-fulling machine.

Wool, felt, felting, mathematical model, ryfli function.

Formulation of the problem. Analyzing the results of previous experimental studies [1-4] densification damp coarse wool found that its deformation under the working surface of the upper plate of the moving ryflyamy is not uniformly over its thickness.

Analysis of recent research. These observations led to the hypothesis of the interaction of the working surface of the upper movable plate compact plate-fulling machine with damp coarse wool, according to which of the surface of ryflyamy compared with a flat surface leads to increase the area of action of tension that occurs in a layer of coarse wool during exercise .

The purpose of research. To prove geometric parameters ryfliv working surface of the upper movable plate compact plate-fulling machines.

Results. To test the hypothesis about the feasibility of using ryfliv on the working surface of the upper movable plate compact plate-fulling machine, consider the stress and deformation state damp coarse wool, which loaded the entire region on its surface. In the adopted coordinate system boundary surface coincides with the plane XY, and the axis OZ directed the thickness of wool. The load directed along the axis OY and has a width 2a povzdovzh axis OX; on this axis are normal and tangential efforts that depend only on the coordinates x. We take that as a result of rough wool straight implemented load state plane strain is $\varepsilon y = 0$.

Fig. 1 shows a rough sectional layer of damp wool. Surface force p (x) and q (x) operating in the border area from x = - a to x = a. Define the components of the stress that caused by efforts to p (x) and q (x) at any point.

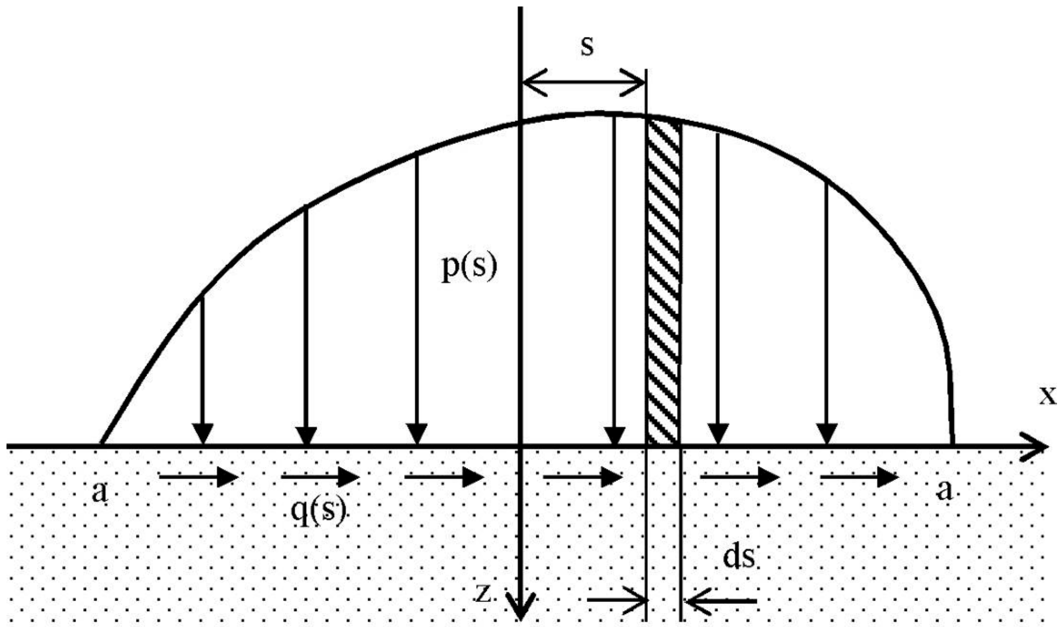

Fig. 1. Diagram of deformation damp coarse hair.

The equation to balance tensions plane problem is:

$$\begin{aligned} \frac{\partial \sigma_x}{\partial x} + \frac{\partial \tau_{xz}}{\partial z} = 0, \\ \frac{\partial \sigma_z}{\partial z} + \frac{\partial \tau_{xz}}{\partial x} = 0. \end{aligned} \quad (1)$$

where: σx, σz - normal tension acting on an element of rough wool along OX and OZ; τxz - shear stress acting on an element of rough wool.

The corresponding strain εx, εz γxz and must satisfy the equation compatibility:

$$\frac{\partial^2 \varepsilon_x}{\partial z^2} + \frac{\partial^2 \varepsilon_z}{\partial x^2} = \frac{\partial^2 \gamma_{xz}}{\partial x \partial z}, \qquad (2)$$

where: εx, εz - linear deformation element coarse wool along OX and OZ; γxz - angular deformation element coarse wool.

In terms of plane strain are:

$$\varepsilon_y = 0, \quad \sigma_y = \nu(\sigma_x + \sigma_z), \qquad (3)$$

then the equation for the elastic-visco-plastic body that connects the tension and strain is:

$$\begin{aligned} \eta\frac{\partial \varepsilon_x}{\partial t} + E\varepsilon_x &= \xi\left[\left(1-\nu^2\right)\sigma_x - \nu(1+\nu)\sigma\right]_z, \\ \eta\frac{\partial \varepsilon_z}{\partial t} + E\varepsilon_z &= \xi\left[\left(1-\nu^2\right)\sigma_z - \nu(1+\nu)\sigma_x\right], \\ \eta\frac{\partial \gamma_{xz}}{\partial t} + E\gamma_{xz} &= \xi\left[2(1+\nu)\tau_{xz}\right], \end{aligned} \qquad (4)$$

where: η - viscosity; E - modulus of elasticity; ν - Poisson's ratio; ξ - coefficient of flexibility.

Further calculation consider the stationary problem (instant time greatest strain), ie $\frac{\partial \varepsilon_x}{\partial t} = 0$:

$$\begin{aligned} \varepsilon_x &= \frac{\xi}{E}\left[\left(1-\nu^2\right)\sigma_x - \nu(1+\nu)\sigma_z\right], \\ \varepsilon_z &= \frac{\xi}{E}\left[\left(1-\nu^2\right)\sigma_z - \nu(1+\nu)\sigma_x\right], \\ \gamma_{xz} &= \frac{\xi}{E}\left[2(1+\nu)\tau_{xz}\right]. \end{aligned} \qquad (5)$$

Efforts acting on the surface element ds width at a point located at a distance s from the origin, can be interpreted as a concentrated force [5] value pds acting normal to the surface, and the value qds tangent:

$$\begin{aligned} \sigma_x &= -\frac{2z}{\pi\xi}\int_{-a}^{a}\frac{p(s)(x-s)^2 ds}{\left[(x-s)^2+z^2\right]^2} - \frac{2}{\pi\xi}\int_{-a}^{a}\frac{q(s)(x-s)^3 ds}{\left[(x-s)^2+z^2\right]^2}, \\ \sigma_z &= -\frac{2z^3}{\pi\xi}\int_{-a}^{a}\frac{p(s) ds}{\left[(x-s)^2+z^2\right]^2} - \frac{2z^2}{\pi\xi}\int_{-a}^{a}\frac{q(s)(x-s) ds}{\left[(x-s)^2+z^2\right]^2}, \\ \tau_{xz} &= -\frac{2z^2}{\pi\xi}\int_{-a}^{a}\frac{p(s)(x-s) ds}{\left[(x-s)^2+z^2\right]^2} - \frac{2z}{\pi\xi}\int_{-a}^{a}\frac{q(s)(x-s)^2 ds}{\left[(x-s)^2+z^2\right]^2}. \end{aligned} \qquad (6)$$

Consider stress-deformation state of coarse wool moistened under load p (x) = const, q (x) = 0, which caused a flat working surface of the upper movable plate compact plate-fulling machine (Fig. 2). The relative deformation along the axis OZ will be:

$$\varepsilon_z(x) = \varepsilon_0 = \text{const}. \quad (7)$$

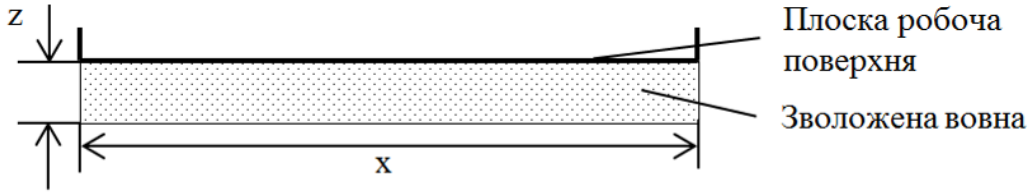

Fig. 2. The flat working surface of the upper movable plate compact plate-fulling machine.

Solving the system of differential equations (5) - (7) numerical methods in the software package Maple and considering that p (x) = p0 = = const and q (x) = 0, we get the graphics division of normal tensions σz and σx at each point layer damp coarse wool (Fig. 3).

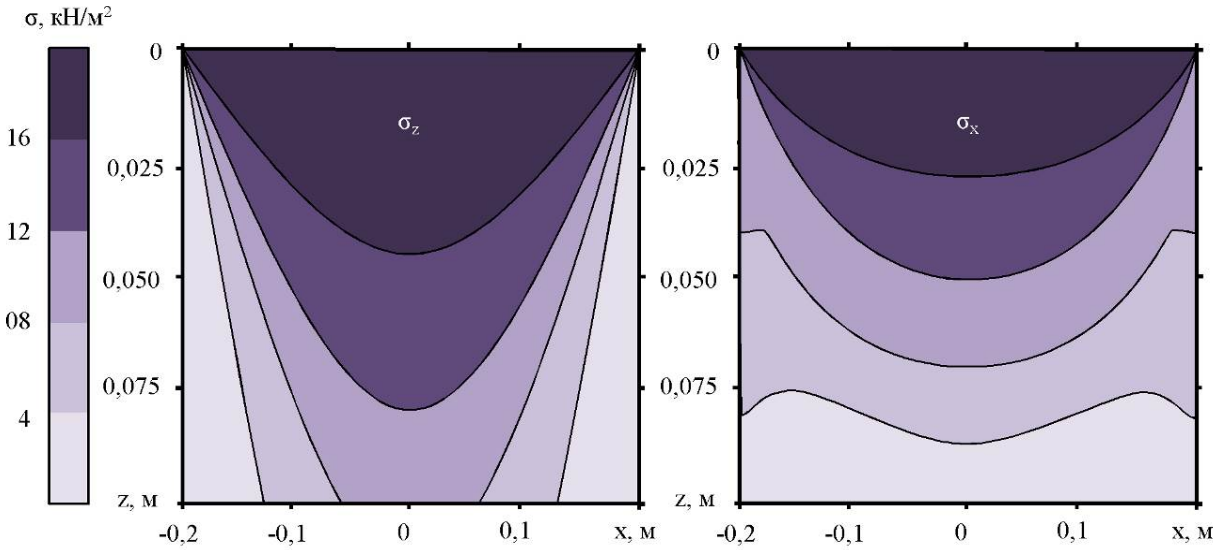

Fig. 3. Charts normal distribution strengths σz σx and at every point damp layer of coarse wool under a flat work surface.

Consider stress-deformation state of coarse wool moistened under load p (x), q (x) = 0, which is due to the working surface of the plate-fulling machines with ryflyamy (Fig. 4). To simplify the calculations take account of the working surface as a function $z = \frac{\lambda}{2}\cos\left(\frac{\pi x}{\lambda}\right)$. The relative deformation along the axis OZ will be:

$$\varepsilon_z(x) = \varepsilon_0 + \frac{\lambda}{2H}\cos\left(\frac{\pi x}{\lambda}\right). \quad (8)$$

where: λ - ryfliv geometric parameters (parameter characterizing the oscillation frequency profile of the working surface ryfliv); H - thickness of the wool.

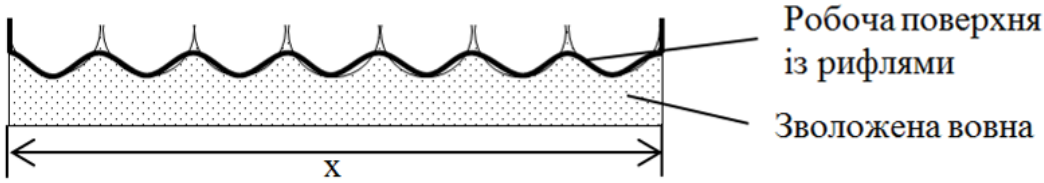

Fig. 3. The working surface of the upper movable plate compact plate-fulling machines with ryflyamy.

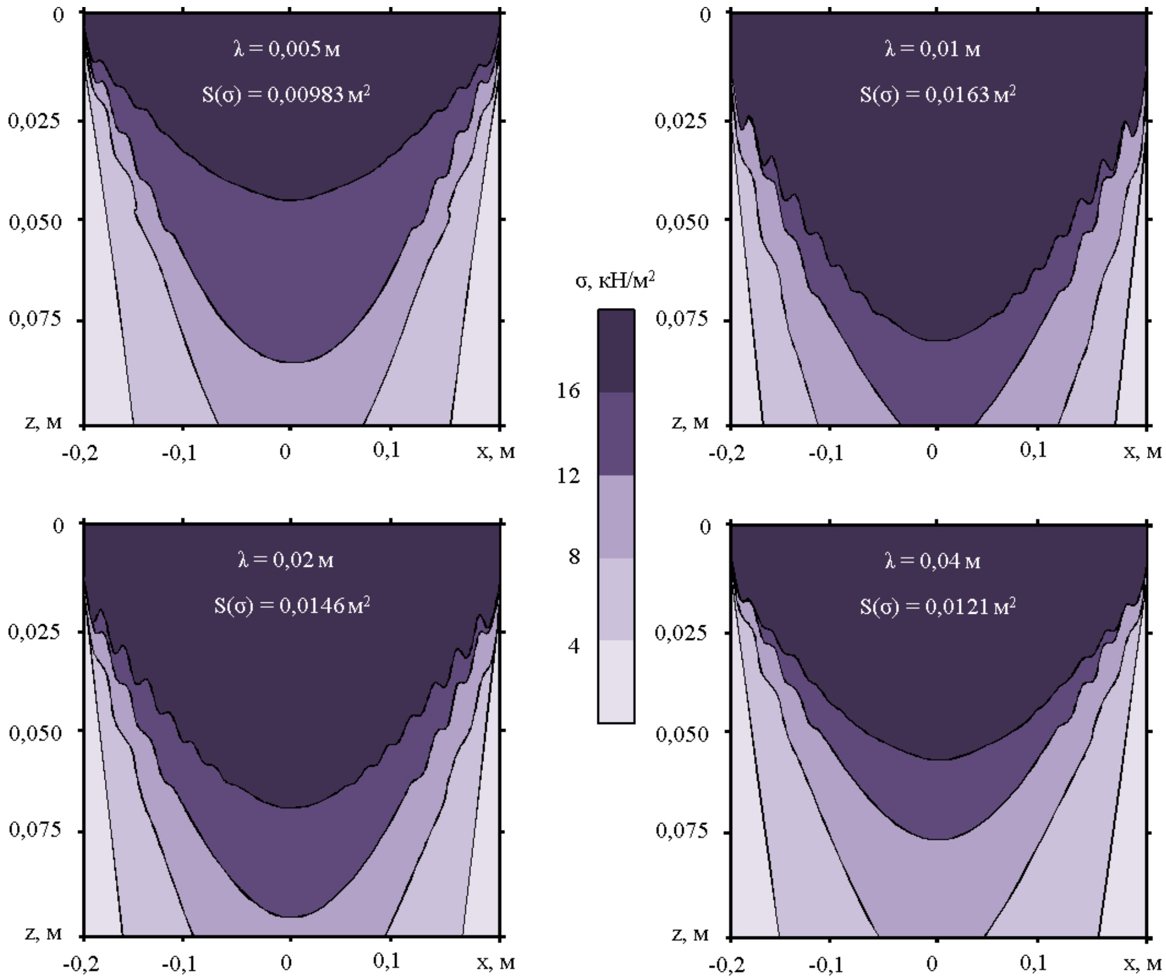

Fig. 4. Charts normal intensity distribution at each point σz layer of coarse wool moistened under the working surface of the upper plate of the moving ryflyamy with different geometrical parameter λ.

According to research [5] press sinusoidal surface causes sinusoidal intensity change over the entire area of action in the material that is pressed. Therefore, solving the system of differential equations numerical methods in the software package Maple and considering that

$p(x) = p_0 \cos\left(\frac{\pi x}{\lambda}\right)$ and q (x) = 0, we get the graphics division of normal tension at every point σz layer of coarse wool moistened with different geometrical parameters ryfliv λ (Fig. 5).

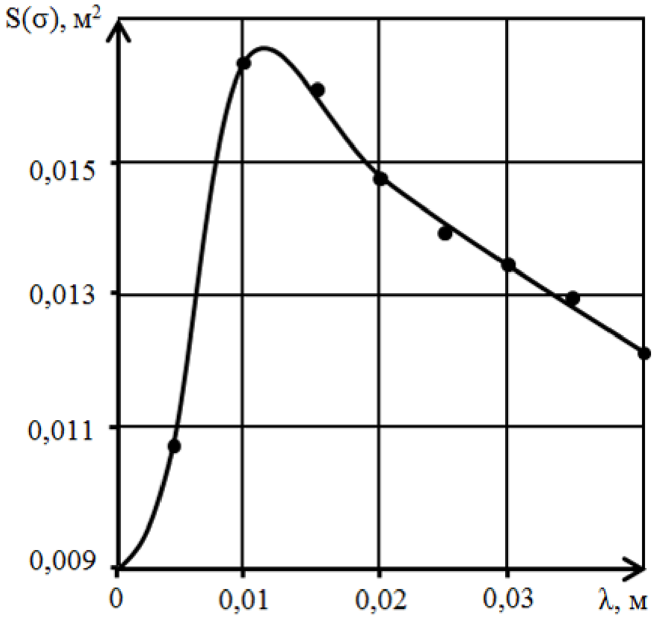

Fig. 5. Graph of the action areas of tension S (σ) of ryfliv geometric parameter λ.

Graph of the action areas of tension ryfliv geometric parameters (Fig. 5) confirms the hypothesis set by the interaction of the working surface of the upper movable plate compact plate-fulling machine with damp coarse fleece [6]. From Fig. 5 shows that the maximum area of action intensity observed in geometric ryfliv parameter λ = 0,011 m. According to this geometry ryfliv working surface of the upper movable plate compact plate-fulling machine should be presented as a function $z = \frac{\lambda}{2}\cos\left(\frac{\pi x}{\lambda}\right)$ = 0,0055 · cos (285,6 · x) (m).

Conclusion. Based on the conditions intensifying the process of felting wool rough layer in Felt reasonably ryfliv geometric parameters of the working surface of the upper movable plate compact plate-fulling machine. From the condition of maximum area tension action that occurs in a layer of coarse wool during loading geometry set ryfliv working surface of the upper movable plate compact plate-fulling machine as a function $z = \frac{\lambda}{2}\cos\left(\frac{\pi x}{\lambda}\right)$ = 0,0055 · cos (285,6 · x) (m).

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Based IZ uslovyy yntensyfykatsyy process hruboy ovechey fulling wool in cavity voylochnыy obosnovanno heometrycheskye Options ryfley a working surface podvyzhnoy top plates malohabarytnoy plate-fulling machine. IZ terms maksymalnoy Square napryazhennosty action, kotoraja arise in sloe hruboy ovechey wool t TIME load installed a working surface geometry ryfley top podvyzhnoy plates malohabarytnoy plate-fulling machine.

Wool, felt, fulling, matematycheskaya model ryfly, function.

Based on the conditions of intensification of the process of felting coarse wool felt in cavities reasonable geometric parameters of corrugation working surface of the upper movable plate compact plate-fulling machine. From the condition of the maximum area of action of tension that occurs in a layer of coarse wool during exercise found corrugation geometry of the working surface of the upper movable plate compact plate-fulling machine.

Wool, felt, felting, mathematical model, riffles, function.