THEORETICAL STUDY OF RAW
COTTON TRANSPORTATION PROCESS
ON THE SUBMISSION AND
DISTRIBUTION DEVICE

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Abstract: The transportation of raw cotton in many respects is carried out through rotating screws or moving tapes. The study considers influence of raw cotton humidity on increase of friction factor during transportation process using submission and distribution device. It is shown that increase of humidity of raw cotton within the limits of 11 up to 38% is accompanied by surge of static and kinetic frictions. The research is executed by experimental methods on the special stand with use of strain measurement.

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With the help Lagrange equation of second kind we can write down the equations of raw cotton movement on a site of elastic deformation on mobile axes XY:

\[
\begin{align*}
\dot{m}_y &= -m_0 \dot{y} - mg \cos \alpha - c_y \dot{y} - k_y \dot{y} + \Phi_y \\
\dot{m}_x &= -m_0 \dot{x} - mg \sin \alpha - c_x \dot{x} - k_x \dot{x} \left( \dot{x} + \ddot{x} \right) + \Phi_x
\end{align*}
\]

(3)

where, \( m \) - weight of raw cotton; \( k_x, k_y \) - rigidity factor of elastic elements; \( c_x, c_y \) - factors of friction; \( \Phi_x, \Phi_y \) - occurring external kinematical influences.

The examination allowed to establish that the increase of humidity of raw cotton in bounds from 11% up to 38% is accompanied by increase of friction coefficients - both static and kinetic. With increase of specific loading on raw cotton, the size of factor of friction reduces, and with increase of speed of sliding of a surface from 0 up to 0.54 m/s, factor of friction reduces rather sharply.

The further increase of speed is accompanied by insignificant decrease of factor of friction which approaches to some constant size. Systems of the differential equation are solved numerically by method of Rung-Kut. Dependence \( \Delta P \) (pressure) from speed \( \nu \) is given in a Figure 2. From the figure it is clear, that \( \Delta P \) strongly depends on internal friction of raw cotton (humidity, contamination, etc.).

The carried out research with composite polymeric coverings of transporting tools has shown that with increase of speed up to the certain size for all normal pressure factor of friction raises, and then lowers a little and accepts some constant size. Systems of the differential equation are solved numerically by method of Rung-Kut. Dependence \( \Delta P \) (pressure) from speed \( \nu \) is given in a Figure 2.
REFERENCES

