WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 2, Feb., 2022

THEORETICAL BASIS OF THE BEHAVIOR OF THE COTTON-COTTON MODEL IN THE SEPARATOR PIPE

Shodiyev Ziyodullo Ochilovich
Candidate of Technical Sciences, Head of the Department of General Professional Disciplines, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Bukhara Branch. shoziyodulla@gmail.com

Umirzakov Jurabek Umirzak
Assistant, Tashkent Institute of Irrigation and Agriculture Mechanisation Engineers, Bukhara Branch.

Annotation

Usually, cotton pieces in the pipe are affected by the force of air absorption, the force of friction on the walls of the pipe and the force of gravity. If the slotted cotton is absorbed by air with a speed of only 0x μ0, which is in the pipe, then the forces Fj,1 and Fj, 2 are considered the Resistance Forces of the air, and their value is found in accordance with the accepted law. Here it is recommended that this law be taken in two ways. Air resistance is proportional to its speed, then it is possible to write the following equations (S1, S2 - resistance coefficients).

Keywords: model, material, elastic, viscosity, dynamic, pipe, torque, non-slip.

Introduction

In the model of one-mass Cotton, a cotton material with a notch is perceived as a point, and its physical properties and geological dimensions are not taken into account. Leading scientists of this model, including S. X. Zire " Lost In Test MatchA.Ziyaev and R. In the scientific work of the murodovs, he made his own expression [1]. Having analyzed the scientific work carried out above, two mass cotton models are recommended in this study (Figure 1). The elastic element k in this model represents the elasticity properties of cotton with a notch, μ - the coefficient of viscosity. Through a two-mass cotton model, dynamic States of cotton with seeds are characterized. The mass, moisture and dirt of the cotton with seeds are represented by the coefficient of viscosity.

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 2, Feb., 2022

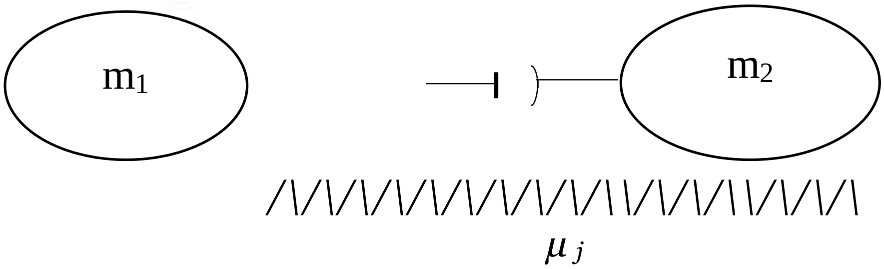


Figure 1 is a cotton model with two masses of seeds.

Ularga influences eluvchi kuchlar arodynamic, ishkalanish, agirlik and impulsladi. Time information can only be available for two countries, including kopecks.

$$m_1U_{j,1} + k_j\,(U_{j,1} - U_{j,2}) + 2\,\mu_j\,(U_{j,1} - U_{j,2}) = F_{j,1} \qquad (1)$$
$$m_2U_{j,2} + k_j\,(U_{j,2} - U_{j,1}) + 2\,\mu_j\,(U_{j,2} - U_{j,1}) = F_{j,2}$$

Here M1, m2 - masses of cotton slices; kj - coefficient of elasticity; μ j, - coefficient of viscosity. FJ,1 and Fj, 2 are projections of the external forces acting on the masses in coordinate axes.

Usually, cotton pieces in the pipe are affected by the force of air absorption, the force of friction on the walls of the pipe and the force of gravity. If the slotted cotton is absorbed by air with a speed of only 0x μ0, which is in the pipe, then the forces Fj,1 and Fj, 2 are considered the Resistance Forces of the air, and their value is found in accordance with the accepted law. Here it is recommended that this law be taken in two ways. Air resistance is proportional to its speed, then it is possible to write the following equations (S1, S2 - resistance coefficients).$F_{1,i}=C_i\,(\upsilon_o - U_{1,i})$,

$$F_{2,i} = -C_iU_{2,i}, \quad F_{3,i} = -C_iU_{3,i}, \qquad (2)$$

If the Air Force acting on a cotton seedling is proportional to the square of its speed, then for the projections of external forces we get the following expression (A1, A2 - new coefficients).

$$F_{1,i}=A_i\,(\upsilon_o - U_{1,i})\sqrt{(\upsilon_0 - U_{1,i})^2 + U_{2i}^2 + U_{3i}^2}$$
$$F_{2,i}=A_iU_{2,i}\sqrt{(\upsilon_0 - U_{1,i})^2 + U_{2i}^2 + U_{3i}^2} \qquad (3)$$
$$F_{3,i}=A_iU_{2,i}\sqrt{(\upsilon_0 - U_{1,i})^2 + U_{2i}^2 + U_{3i}^2}$$

The solution of the above (1) equations should satisfy the following initial conditions when t=0:

$$U_{j,i} = 0, \quad U_{j,i} = 0$$

As can be seen from the expressions (2) and (3), in the first case, the equations written on the X, y, z axis will not be related to each other, and their solution can be obtained separately. In the second case, the equations will depend on each other and it will be necessary to compare them together.

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 2, Feb., 2022

To take into account the friction forces on the inner surface of the pipe that affect the masses, we look at the state of the air resistance forces (2) expressed in the formula. Without it, the masses will move only in the direction of the axis 0x, so we will assume that U21 = U22 = U31 = U32 = 0 using the initial conditions. Three cases can be seen depending on the location of the masses relative to the pipe wall.

The first mass is smeared along the surface of the tub, and the second mass in a free manner, which is connected with the first mass with the elements of the bicarbonate and the consistency. The equations of motion of the masses in this case can be written as follows,taking into account the forces of air resistance and friction: (FMP, 1 = fm1g, F - coefficient of friction between the inner surface of the coupler and the cotton interstitial).

$$m_1\ddot{U}_{1,1} + k_1 (U_{1,1} - U_{1,2}) + 2\mu_1(\acute{U}_{1,1} - \acute{U}_{1,2}) = C_1(\upsilon_0 - \acute{U}_{1,1}) - F_{mp,1}$$
$$m_2\ddot{U}_{1,2} + k_1 (U_{1,2} - U_{1,1}) + 2\mu_1(\acute{U}_{1,2} - \acute{U}_{1,1}) = C_2(\upsilon_0 - \acute{U}_{1,2})$$

If the starting moment of motion (t = 0) is fulfilled by the following condition C1u0 > Fmp,then 1 then both masses come into motion,and (4) equations are integrated with conditions U1,1 = U1, 2= 0,Ú1,2 in t = 1. If C1u0 > Fmp,1 inequality is performed at T = 0 torque, then T=t1 is in a state of reflection of the first mass until the moment, and the second mass will be a satisfactory solution of the conditions of the following equation U1,1(0)= 0, Ú1,2(0) = 0.

$$m_2\ddot{U}_{1,2} + k_1U_{1,2}+ 2\mu_1\acute{U}_{1,2} = C_2(\upsilon_0 - \acute{U}_{1,2})$$

The starting moment of the first mass movement is t=t1, which can be found from the following equation:

$$k_1U_{1,2}(t_1) + 2\mu_1\acute{U}_{1,2}(t_1) + C_1\upsilon_0 - F_{mp}$$

t ≥ t1 in torque (4) the system of equations t=t1 in U1,1 = 0, U1,2= U_1,2^2, Ú1,1 = 0, Ú1,2 = 〖U〗_1,2^2 (where U_1,2^1 and Ú_1,2^2 are the displacement and velocity of the second mass t=t1 in torque) is integrated with the conditions. If c1u0 > Fmp,1 inequality is performed at T=0 torque, then t=t1, until the moment the first mass is in a state of excitation,the second mass will be a satisfactory solution of the following equation conditions U1, 2(0) = 0,Ú1, 2 (0) = 0.

$$m_2\ddot{U}_{1,2} + k_1U_{1,2}+ 2\mu_1\acute{U}_{1,2} = C_2(\upsilon_0 - \acute{U}_{1,2})$$

The beginning moment of the first massapakarakat is found from the equation t=t1 melody:

$$k_1U_{1,2}(t_1) + 2\mu_1\acute{U}_{1,2}(t_1) + C_1\upsilon_0 - F_{mp,1} =0$$

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 2, Feb., 2022

t ≥ t1 in torque (4) system of equations t=t1 in U1,1 = 0, U1,2= U_1,2^2, Ú1,1 = 0, Ú1,2 = 〖U〗_1,2^2 (here u_1,2^1 and Ú_1,2^2 - the displacement of the mass in the second torque t=t1 in torque and speed) is integrated with the conditions.

The second mass is in free motion along the surface of the pipe, while the first mass is in contact with the second mass with the elements of the bicarbonate and the cowl. We write the equation of motion of masses as follows: (Fmp,2 = fm2g).

$$m_1\ddot{U}_{1,1} + k_1(U_{1,1} - U_{1,2}) + 2\mu_1(\acute{U}_{1,1} - \acute{U}_{1,2}) = C_1(\upsilon_0 - \acute{U}_{1,1}) \qquad (5)$$
$$m_2\ddot{U}_{1,2} + k_1(U_{1,2} - U_{1,1}) + 2\mu_1(\acute{U}_{1,2} - \acute{U}_{1,1}) = C_2(\upsilon_0 - \acute{U}_{1,2}) - F_{mp,2}$$

If C2u0< Fmp,2 inequality is performed at T=0 torque, then the second mass until T=t1 torque is in the unstressed position, and the first mass will be the solution of this equation,which satisfies the following conditions: U1, 2(0)=0,Ú1, 2(0)=0.

$$m_2\ddot{U}_{1,1} + k_1U_{1,1} + 2\mu_1\acute{U}_{1,1} = C_1(\upsilon_0 - \acute{U}_{1,1})$$

The starting moment of the second mass movement t=t2 can be found from the following equation:

$$k_1U_{1,1}(t_2) + 2\mu_1\acute{U}_{1,1}(t_2) + C_2\upsilon_0 - F_{mp,2} = 0$$

t ≥ t2 in torque (5) the system of equations t=t2 in U1,1= U_1,1^1, U1,2=0, Ú1,1 = 〖〗U _1,1^1, Ú1,2 = 0, (where U_1,1^1 and Ú_1,1^1 are the displacement and velocity of the first mass t=t2 in torque) is integrated with the conditions. Both masses move along the surface of the pipe, then the system of equations will have the following appearance::

$$m_1\ddot{U}_{1,1} + k_1(U_{1,1} - U_{1,2}) + 2\mu_1(\acute{U}_{1,1} - \acute{U}_{1,2}) = C_1(\upsilon_0 - \acute{U}_{1,1}) - F_{mp,1} \qquad (5)$$
$$m_2\ddot{U}_{1,2} + k_1(U_{1,2} - U_{1,1}) + 2\mu_1(\acute{U}_{1,2} - \acute{U}_{1,1}) = C_2(\upsilon_0 - \acute{U}_{1,2}) - F_{mp,2}$$

In this case,the beginning of the mass movement will depend on the performance of the following conditions C1u0< Fmp, 1,C2u0< Fmp, 2. If for both masses
If c1u0< Fmp,1, C2u0< Fmp,2 is done, then the value of the suction power in the Hopper case will not be enough to ensure the movement of cotton wool, and therefore the cotton wool of the hopper will be in an unsteady state. If c1u0< Fmp,1, C2u0< Fmp,2 conditions are met, then the first mass is in motion, the second mass is in motion after a certain time, and vice versa,C1u0< Fmp, 1,C2u0< Fmp, 2 conditions are met, then the second mass is in motion,the first mass is in motion after a certain time, and nixoo AT t=0>Fmp,1, C2u0>the mass is in a state of uniform consistency.
(1) we see the case of the system of differential equations with the apparent power of external anxiety (2). We find its solution using the replacement of laplas on the basis of the initial condition. If you have the option of replacing R laplas it sets the functiondag for the case

$$\bar{U}_{j,i}(p) = \int_0^\infty U_{j,i}(t)\, dt$$

(1)we bring the system of differential equations to the following curvature (k = k1, μ= μ1, ą= ą1, ą1,ą2):

$$\bar{U}_1 = \frac{\upsilon_0}{\omega^2 \overline{p^2}(\overline{p^3} + \bar{\alpha}_2 \overline{p^2} + \bar{\alpha}_1 \bar{p} + \bar{\alpha}_0)} [\overline{C_2 p^2} + (2\mu\, \bar{\alpha}_0 + \overline{C_1 C_2})\, \bar{p} + \bar{\alpha}_0\}$$

$$\bar{U}_1 = \frac{\upsilon_0}{\omega^2 \overline{p^2}(\overline{p^3} + \bar{\alpha}_2 \overline{p^2} + \bar{\alpha}_1 \bar{p} + \bar{\alpha}_0)} [\overline{C_2 p^2} + (2\mu \bar{\alpha}_0 + \overline{C_1 C_2})\, \bar{p} + \bar{\alpha}_0]$$

Here

$$\bar{\alpha}_0 = \overline{C_1}\bar{\alpha}_1 - \overline{C_2}\bar{\alpha}_2\ \bar{\alpha}_1 = \bar{\alpha}_1\bar{\alpha}_2 + 2\mu\, \bar{\alpha}_0 + \overline{C_1 C_2},\ \bar{\alpha}_2 = 2\mu\, \alpha_1\bar{\alpha}_2 + \overline{C_1} + \overline{C_2},$$

$$\alpha_i = \frac{m_1 + m_2}{m_i},\quad \overline{C_i} = \frac{\overline{C_i}}{\omega m_i},\quad \bar{\mu} = \frac{\mu}{\omega\,(m_1 + m_2)}$$

if the Polygon (p^3) +α _2 (p^2) +α _1 p +α _0 has the following appearance (p^3) +α _2 (p^2) +α _1 p +α _0 = (p+α) [〖(p+b)〗 ^2+c^2], we get the following expression so that it can move Cotton Springs at the moment:

$$U_1 = \frac{\upsilon_0}{\omega}\{\overline{C_1} f(\tau,\alpha) + \frac{2\bar{\mu}\, \bar{\alpha}_0 + \overline{C_1 C_2}}{\alpha}[f(\tau,0) - f(\tau,\alpha)] + \frac{\bar{\alpha}_0}{\alpha}[\varphi(\tau,0) - \varphi(\tau,\alpha)]\},$$

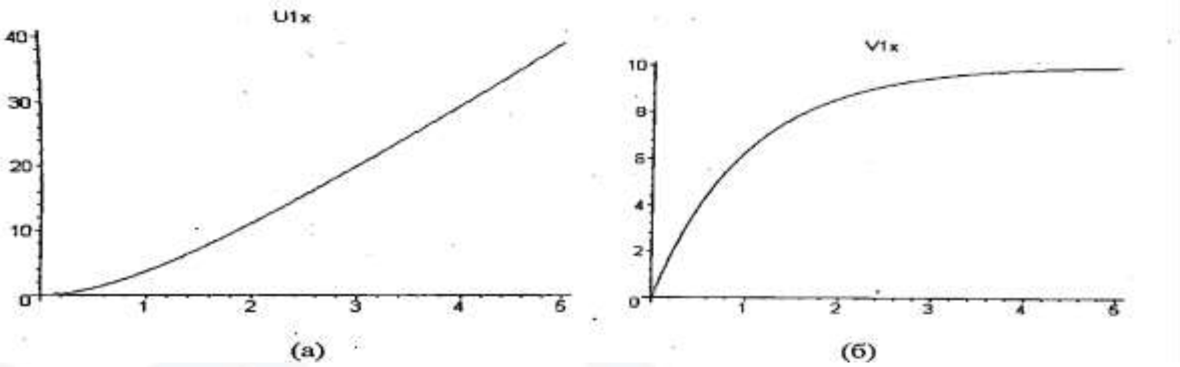
$$U_2 = \frac{\upsilon_0}{\omega}\{\overline{C_2} f(\tau,\alpha) + \frac{2\bar{\mu}\, \bar{\alpha}_0 + \overline{C_1 C_2}}{\alpha}[f(\tau,0) - f(\tau,\alpha)] + \frac{\bar{\alpha}_0}{\alpha}[\varphi(\tau,0) - \varphi(\tau,\alpha)]\},$$

Here

$$f(\tau,\alpha) = \frac{1}{(b-\alpha)^2 + c^2}[e^{-\alpha\tau} - e^{-b\tau}\cos c\tau + \frac{b-\alpha}{c} e^{-b\tau}\sin c\tau],$$

$$\varphi(\tau,\alpha) = \frac{1}{(b-\alpha)^2 + c^2}\{\frac{1 - e^{-\alpha\tau}}{\alpha} - \frac{e^{-b\tau}}{b^2 + c^2}[b\cos c\tau + \mathrm{c}\sin c\tau - b - \frac{(b-\alpha)}{c}(b\sin c\tau + \mathrm{c}\cos c\tau - c)]\}$$

The time-dependent graph of the displacement and speed is shown in Figure 2. As it turns out, the speed was approaching the asymptotic outfit of Uzi with a wakt utishi.



(6) Picture 2. The graph of the relation of the displacement (A) and speed (B) to time.

References

1. Nikitin N.N. Course of theoretical mechanics. M.: Higher school, 1990, p.608
2. Meshersky I.V. Collection of problems in theoretical mechanics. M.: Nauka, 1986, p.448.
3. Artobolevsky I.I. Theory of mechanisms and machines: Textbook. M.: Nauka, Main editorial office of physical-mathematical literature. 1975, p.640
4. Ryazantseva I.L. Theory of mechanisms and machines in questions and answers: Tutorial. Publishing house of Omsk STU, 2013, p.132
5. Fedorov N.N. Design and kinematics of flat mechanisms: Tutorial. Publishing house of Omsk STU, 2000, p.144
6. Fedorov N.N. Theory of mechanisms and machines: Tutorial. Tutorial. Publishing house of Omsk STU, 2008, p.222
7. Dyundik O.S. Structure and kinematics of mechanisms. Tutorial. Publishing house of Omsk STU,2017, p.144.
8. Baranov, G.G. Course of theory of mechanisms and machines: Tutorial. G.G. Baranov, 5th edition. M.: Mechanical Engineering, 1975, p.496
9. Belokonev, I.M. Theory of mechanisms and machines: summary of lectures. 2nd edition revised and added. M.: Drofa, 2004, p.174
10. Kozhevnikov, S.N. Fundamentals of structural synthesis of mechanisms. Textbook. Kiev: Nauk. Dumka, 1979, p.323.
11. Kozhevnikov, S.N. Theory of mechanisms and machines: Textbook. M.: Nauka, 1973, p.784.
12. Levitsky, N.I. Theory of mechanisms and machines. - M.: Nauka, Main editorial office of physical- mathematical literature. 1979, p.576
13. Bezhanov B.N. Pneumatic mechanisms. M.-L., Mashgiz, 1957.
14. Popov S.A. Yearly design on theory of mechanisms and mechanics of machines. M., High School, 1986.
15. Pyataev A.V. Dynamics of machines. Tashkent, Tashkent State Technical University, 1992.
16. Izzatov Z.X. Yearly design on theory of mechanisms and machines. Tashkent, “O’qituvchi”, 1979.
17. Kodirov R.X. Yearly design on theory of mechanisms and machines. Tashkent, “O’qituvchi”, 1990.
18. Rustamxujayev R. Problem and set of examples from the theory of mechanisms and machines. Tashkent, “O’qituvchi”, 1987.
19. Usmonxojayev X.X. Theory of mechanism and machines. Tashkent, “O’qituvchi”, 1981.

20. The results of the experimental nature of the vibrations of the grid cotton cleaner
21. Z Shodiyev1, A Shomurodov1 and O Rajabov2 Published under licence by IOP Publishing Ltd IOP Conference Series: Materials Science and Engineering, Volume 883, International Scientific Conference Construction Mechanics, Hydraulics and Water Resources Engineering (CONMECHYDRO – 2020) 23-25 April 2020, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Tashkent, UzbekistanCitation Z Shodiyev et al 2020 IOP Conf. Ser.: Mater. Sci. Eng. 883 012169.