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DETERMINATION OF GROUND FORCES ON WHEEL TIRE

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Аннотация: В данной статье описаны величина и направление сил, действующих на пневматические шины колеса трактора от почвы в поле при междурядной обработке хлопчатника.

Ключевые слова: Трактор, ходовая система, колесо, шина, эксплуатация, универсал, шина, коэффициент, грунт, крутящий момент, деталь, эгат.

Abstract: This article describes the magnitude and direction of the forces acting on the pneumatic tires of the tractor wheel from the soil in the field during inter-row cultivation of cotton.

Key words: Tractor, running system, wheel, tire, operation, station wagon, tire, coefficient, soil, torque, detail, egate.

Introduction: It is known that in agriculture, when machine-tractor units work in extreme conditions, this process causes the tractor's walking system to not fully provide the working resource. In order to determine the impact of the tire on the soil during tractor operation, the impact forces were obtained by calculating the bending moments. Determination of impact forces and bending moments on the cross-section of two supports under the influence of a uniformly distributed force (Fig. Due to the symmetry of the base reaction system $F_p = F_b = q \cdot L/2$ (if qL - total load on soil).

Soils cover only the same area, $x = x_1$ $(0 \leq x_1 \leq L)$ internal force factors are usually determined by equations (1) and (2).

$$Q_y(x_1) = \Sigma F_y^{(n)} . \qquad (1)$$

$$M_z(x) = m_c^{(n)} . \qquad (2)$$

As it is

$$Q_y(x_1) = F_a - qx_1 = qL/2 - qx_1 .$$

$$M_z(x_1) = F_a x_1 - qx_1 \cdot x_1/2 = qLx_1 / 2 - qx_1^2 / 2 .$$

The first of these equations is a straight line equation. It can be expressed using two points:

If $x = 0$ $Q_y(0) = q \cdot L/2;$ $x = L \cdot Q_y(0) = - q \cdot L/2.$

A force diagram drawn along these ordinates is shown in Fig. 1, b.

The second equation of the parabola $x = 0$ moment $M_z(0) = 0$, $x = L$ moment $M_z(L) = 0$. In the middle section of Egat $x = L/2$ -bending moment $(L/2 = q \cdot L^2/8)$. A diagram of bending moments is shown in Figure 1. The graphs show that the lateral force is zero at the section where the bending moment is maximum.

Differential relationships between the factors of influence. It is cut from the egate in Fig. 1 with two simple parts dx long element (Fig. 1, d). Suppose the impact force Q_y and bending moment M_z *Qlet it act on the left part of the plane, then the impact force on the right part of the plane*$_y + dQ_y$, $M_{zand\ torque}$ + d M_z will be equal to.
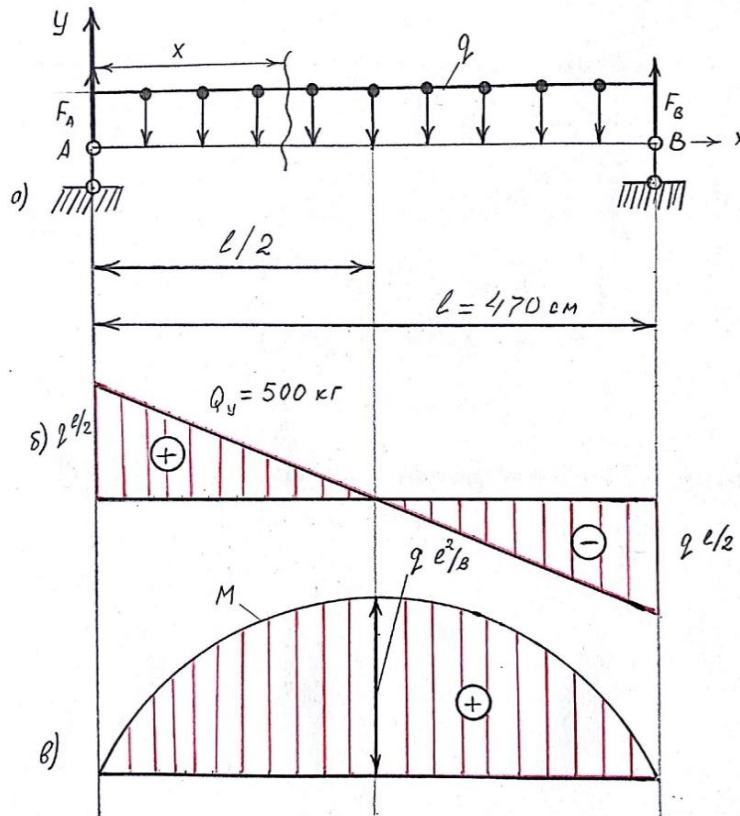

Figure 1. Two-beam support under the influence of the distributed load on the surface of the egate

We construct the equilibrium equations of Egata:

$\Sigma\ m_o = M_z - (M_z + dM_z) + (Q_y + d\ Q_y)dx + q\ dx\ dx/2 = 0.$

$\Sigma\ Y = Q_y - q\ dx - (Q_y + d\ Q_y) = 0.$

We omit the multiples because they are of small order of magnitude compared to the rest of the values.

$d\ Q_y\ dx$ and $q(dx)^2$ we compare and determine the second-order magnitude for other actions:

d $M_z / dx = Q_y$.

$d\ Q_y / dx = -q$.   (3)

The positive sign in the second ratio indicates that the load q is positive if it is directed upward. From these relationships comes the equality in the world

$d^2 M_z / dx^2 = -q$.   (4)

Differential relations (3) and (4) are used in the analysis of issues related to egat (soil). With their help, you can check the correctness of drawing diagrams of moments and forces. This Q_y (x_1) and M_z (x_1) the above equations for x_1 is easy to verify by differentiating with respect to

We determine the abscissa of the Egat section, where the bending moment has an extreme value (Fig. 1, a). d M_z (x_1) / $dx_1 = 0$ $ql/2 - q x_1 = 0$ or $x_1 = L/2$ we find..

Conclusion: The above analysis shows that the section with the maximum bending moment has the lowest impact force on the ground.

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