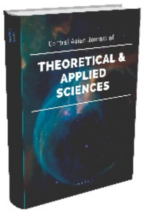

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The Internal Tension Forces of the Balk Section and their Specific Method of Building their Epyuras

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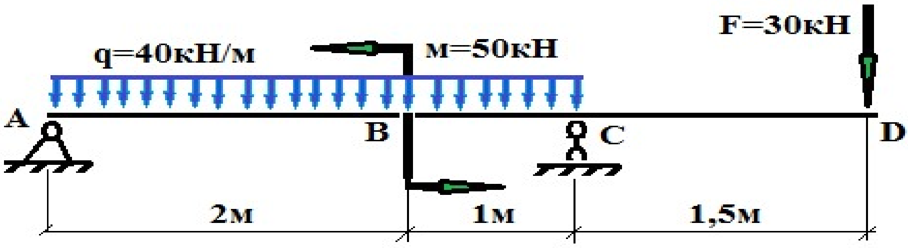
Abstract: *The structural elements used in construction are required to be able to work for a long time, without losing their strength, durability and priority under the influence of external forces. The article develops methods for determining the internal stress forces generated in the cross-sections of bending-resistant parts in technical structures and construction areas, and recommendations for the construction of their diagrams.*

KeyWords: *beam, force, internal tension, transverse force, bending moment distributed force, epyura.*

Consistent implementation of state targeted programs for the construction of affordable housing in rural areas and multi-storey housing in cities, young families, military personnel, and employees of budget organizations and other categories of the population continues [3]. This requires that the structural elements used in construction are strong, priority and have the ability to withstand the effects of external forces for a long time.

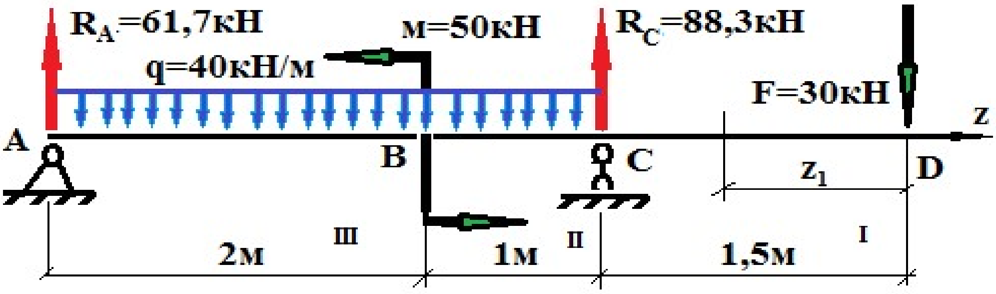
It known that bending resistance parts are widely used in technical constructions and construction industries. One of the most important conditions in the process of designing them is of course to know which part or point is dangerous. Therefore, representatives of this field need to know the methods of determining the internal stress forces generated in the cross sections of bending resistance parts and the use of their diagrams [1, 2].

Which determined the tensile stresses in bending. I. Juravsky, who studied longitudinal bending, F.S. Yasinsky, as well as I.G. Bubnov, A.N. Krilov, B.G. Galerkin, S.P. Temoshenko, N.N. Davidenkov, N.M.Belaev, V.S.Serensen, S.D. Ponomaryov , V.I. Feodosev, M.T. Urozbaev, T.R. Rashidov, A. Nabiev, B.Q Karabaev and other scientists studied the theories and methods of calculating strength. Stubbornness and priority, and below are the specifics of determining the forces of internal stress style is recommended. It is best to start with an analysis of the forces placed on the beam. For example, a beam attached to two supports given a load of accumulated force (F), bending moment (M) and evenly distributed force (q) (Fig. 1), the task of which is to determine the internal stress forces of this beam and construct their diagrams. . Their values given in the diagram.



1-расм. Тўсинда кучларнинг жойлашиш тартиби.

From this scheme, the reaction forces at the bases derived. The beam consists of three power sections. We denote them by Roman numerals from right to left and use the idea intersection method to calculate the internal stress forces in each section (Figure 2).



2-расм. Биринчи қирқимнинг ўтказилиши.

We start the cut from the CD section. The shear size can be obtained up to any point of the CD plot. This shear divides the beam into two parts (right and left). An arbitrary side of the shear can be selected to determine the internal stress forces in the cross-section of the beam [4]. But it is better to choose a less loaded part. So this will be the right part of it.

By marking the distance z_1 from the right edge of the beam to the point of intersection, we leave the left part temporarily, knowing that its size $0 \le z_1 \le 1{,}5\,m$ is equal to [5]. The transverse force in this section is equal to

$$Q_{y_1} = \sum F_i = +F = 30\ кН$$

Here the transverse force has tl(Q_{y_1})ıe value in all parts of the first plot.

The bending moment is determined as follows.

$$M_{x_1} = \sum m_i = -F \cdot z_1 = -30 \cdot z_1$$

Further F is negative because the bottom layer is compressed in this part of the beam. It can be seen from the obtained equation that the bending moment varies linearly. Therefore, when constructing a diagram, it is sufficient to determine the value at two points for this plot $z_1 = 0$ when $M_{x_1}(z_1 = 0) = -30 \cdot 0 = 0$, $z_1 = 1{,}5\ m$ when $M_{x_1}(z_1 = 1{,}5) = -30 \cdot 1{,}5 = -45\ кНм$ will be.

We determine the internal stress forces in the BC section of the section. As above, we pass the second shear from an arbitrary point of the second plot and denote its variable size by z_2 (Figure 3). Its size is equal to $0 \le z_2 \le 1\ m$.

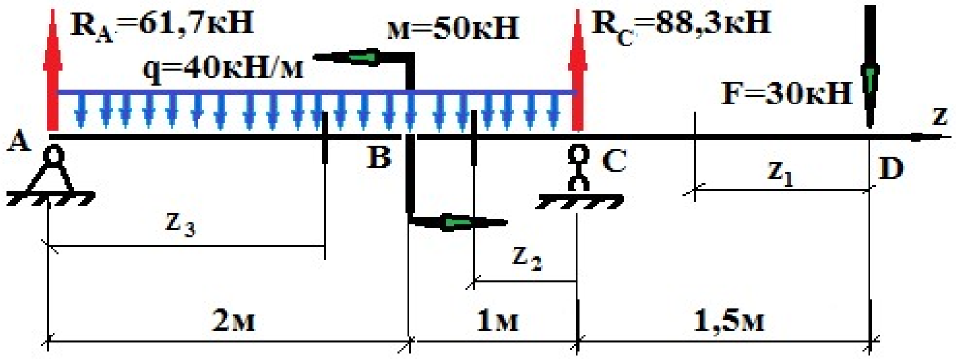


Figure 3. Procedure for cutting in sections 2 and 3.

We compute and calculate the equilibrium equations.

$$Q_{y_{II}} = \sum F_i = F - R_c + q \cdot z_2 = 30 - 88{,}3 + 40 \cdot z_2$$

$$Q_{y_{II}} = (z_2 = 0) = 30 - 88{,}3 + 40 \cdot 0 = -58{,}3\ кН$$

$$Q_{y_{II}} = (z_2 = 1\ м) = 30 - 88{,}3 + 40 \cdot 1 = -18{,}3\ кН$$

We determine the bending moment.

$$M_{x_{II}} = \sum m_i = -F(1{,}5 + z_2) + R_c \cdot z_2 - q \cdot z_2 \cdot \frac{z_2^2}{2} = -30(1{,}5 + z_2) + 88{,}3 \cdot z_2 - 40 \cdot \frac{z_2^2}{2}$$

has $M_{x_{II}}$ a variable value from this, so that the moment diagram in the second section is formed in the form of a parabola.

It is known that in order to draw a parabola, a value of at least three points must be determined [6], in some cases it can be determined from two points depending on its appearance.

$$M_{x_{II}}(z_2 = 0) = -30(1{,}5 + 0) + 88{,}3 \cdot 0 - 40 \cdot \frac{0^2}{2} = -45\ кНм$$

$$M_{x_{II}}(z_2 = 1\ м) = -30(1{,}5 + 1) + 88{,}3 \cdot 1 - 40 \cdot \frac{1^2}{2} = -6{,}7\ кНм$$

We determine the internal stress forces (AB) in the third force plot between the points (Fig. 3).

We cut from any point between the AB points and select the less loaded side i.e. the left side. The variable size for the left plot is equal to $0 \le z_3 \le 2\ m$.

We construct and calculate the equations of transverse force and bending moment for the third section.

$$Q_{y_{III}}(z_3 = 0) = R_A - q \cdot z_3 = 61{,}7 - 40 \cdot 0 = 61{,}7кН$$

$$Q_{y_{III}} = \sum F_i = R_A - q \cdot z_3 = 61{,}7 - 40 \cdot z_3$$

$$Q_{y_{III}}(z_3 = 2м) = 61{,}7 - 40 \cdot 2 = -18{,}3кН$$

$$M_{x_{III}} = \sum m_i = R_A \cdot z_3 - q \cdot \frac{z_3^2}{2} = 61{,}7 \cdot z_3 - 40 \cdot \frac{z_3^2}{2}$$

$$M_{x_{III}}(z_3 = 2) = 61{,}7 \cdot 2 - 20 \cdot 2^2 = 43{,}4 \text{ кНм}$$

$$M_{x_{III}}(z_3 = 0) = 61{,}7 \cdot 0 - 20 \cdot 0^2 = 0$$

It can be seen from the equations that in the third plot the transverse force is linear and the bending moment varies according to the law of parabola.

Based on the obtained sizes, an epyura is constructed. The results obtained in the construction of the diagram are placed on a certain scale along the base line, on the plot belonging to it (Fig. 4).

Transverse force (Q) diagram. The first section consists of a straight line parallel to $Q_{y_1} = const$ the base line so that the transverse force value is kept constant.

On the first plot $Q = 30\,кН$, on the second plot $z_2 = 0$ when -58,3кН, $z_2 = 1м$ while -18,3 кН, on the third plot $z_3 = 0$ when +61,7 кН $z_3 = 2м$ Values equal to -18,3 кН were determined. Based on these values, a diagram is constructed.

Similarly, a bending moment diagram is constructed. When constructing a bending moment diagram, special attention should be paid to [7, 8], the transverse force diagram serves as the basis for the construction of the bending moment diagram. This is because the point $(Q = 0)$ where the transverse force crosses the base line of the beam is much more dangerous. It is at this point that the bending moment has an extreme value.

As can be seen from the constructed diagram, the transverse force crosses the base line only at the third force plot. The issue we are interested in is the maximum value of the bending moment.

In the second section, points were identified that could parabolically connect two endpoints that did not cause an extreme case. To extract the parabola more accurately, it is possible to determine another value from the third point of the plot the middle. For example $z_2 = 0{,}5\ m$.

In the third section, the extreme value at the point where the transverse force intersects the base line must be calculated. To do this, the extreme value of the bending moment at a point where the transverse force is zero is calculated.

The points are then merged with each other in a normal flow.

$$Q_{y_{III}} = R_A - q \cdot z_3 = 0 \qquad z_3 = \frac{R_A}{q} = \frac{61{,}7}{40} = 1{,}54м$$

$$M_{x_{III}}^{'экстр}(z_3 = 1{,}54м) = 61{,}7 \cdot 1{,}54 - 40 \cdot \frac{1{,}54^2}{2} = 47{,}6\ кНм$$

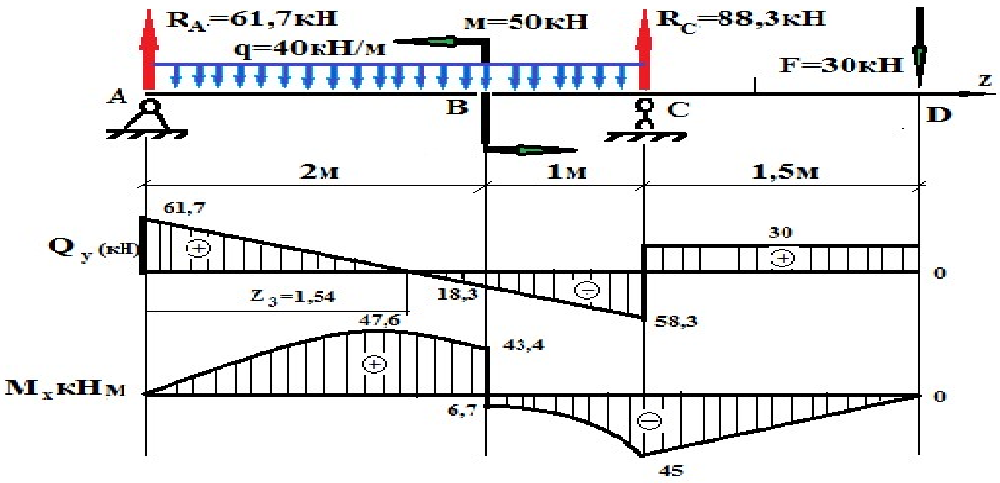


Figure 4. Construction of diagrams of transverse force and bending moments.

From the determined quantities, it can be seen that the last magnitude found in the bending moment diagram is the largest value corresponding to the point where the transverse force intersects the base line, forming the most dangerous section of the beam.

Reference:

1. James M. Gere. Mechanics of materials. Brooks/coole 2015.p. 926.
2. Poland Janco, Branislav Hisko. Introdiction to Mechanics of Materials- Slovak. Pfrt I. 2013.
3. Muratov A.Kh., Kurbanov A.T. Improving the process of delivering scattering loads to the construction objects by using automobile transport. Harvard Educational and Scientific Review. 1 No. 1 (2021) Vol.1. Issue 1 Pages 107-117. http://www.journals.company/index.php/hesr/article/view/13
4. Қорабоев Б. Материаллар қаршилиги. Фан ва технология, 2007,-192 б.
5. Usmonkulov A.Q., Ismayilov K.,Odilov O.K., Yaxshiboev Sh.R. Materiallar qarshiligi, O‘quv qo‘llanma. I,II -qism. Toshkent ”Mashhurpress”, 2019. –320 b.
6. Жуков В.Г. Механика. Сопротивление материалов. Учебное пособие. Изд-во “Лань-П”, 2020. -416 с.
7. Z.S.Shadmanova. Materiallar qarshiligi. O’quv qo’llanma. T.: 2018. 169 b.
8. K.Ismayilov, S.K.Toshev, O.I.Eshniyazov, S.S.Amanov. Materiallar qarshiligi. O’quv qo’llanma. Toshkent, Mashhur-Press, 2017. -272 b.

