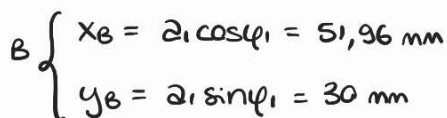


$Q = \quad \text{Nm}$



$$a_6 = y_D = 160 \text{ mm}$$

$$\begin{cases} a_0 + a_n \cos \varphi_n - a_1 \cos \varphi_1 = 0 \\ a_2 + a_n \sin \varphi_n - a_1 \sin \varphi_1 = 0 \end{cases}$$

$$BK = 102,4 \text{ mm}$$

$$\widehat{B\hat{E}K} = \arctg\left(\frac{102,4}{148,04}\right) = 34,67^\circ$$

$$\varphi_n = 180^\circ - 34,67^\circ = 145,33^\circ$$

$$\partial f = y_E = y_B - BK = 30 - 102,4 = -72,4 \text{ mm}$$

$$\begin{cases} 2a_0 + 2a_n \cos \varphi_n - 2a_1 \cos \varphi_1 = 0 \\ 2a_1 + 2a_n \sin \varphi_n - 2a_1 \sin \varphi_1 = 0 \end{cases}$$
$$\begin{cases} a_1 \cos \varphi_1 + a_2 \cos \varphi_2 + a_3 \cos \varphi_3 - a_5 = 0 \\ a_1 \sin \varphi_1 + a_2 \sin \varphi_2 + a_3 \sin \varphi_3 - a_6 = 0 \end{cases}$$
$$\begin{cases} 60 \cos 30^\circ + 120 \cos 42^\circ + 50 \cos 43^\circ - 25 = 0 \\ 60 \sin 30^\circ + 120 \sin 42^\circ + 50 \sin 43^\circ - 160 = 0 \end{cases}$$

$$\overline{AB}^2 = a_6^2 + a_1^2 - 2a_1a_6 \cos \delta$$

$$HB = 140 \text{ mm}$$

$$HK = 26 - 21 \sin \varphi_1 = 160 - 60 \sin 30^\circ = 130 \text{ mm}$$

$$KB = a_1 \cos \phi_1 = 51,96 \text{ mm}$$

$$\hat{H}BK = \arctg\left(\frac{H_K}{K_B}\right) = 68,2^\circ$$

$$\varphi_3 = 90^\circ$$

$$y_c = y_D - a_3 = 120 \text{ mm}$$

$$a_1 \sin \varphi_1 + a_2 \sin \varphi_2 + a_3 = y_D$$

$$\varphi_2 = \arcsin \left(\frac{y_D - a_3 - a_1 \sin \varphi_1}{a_2} \right) = \arcsin \left(\frac{120 - 60 \sin 30^\circ}{120} \right) = 48,6^\circ$$

$$C \begin{cases} y_c = 120 \\ x_c = a_1 \cos \varphi_1 + a_2 \cos \varphi_2 = 131,3 \text{ mm} = x_D = a_5 \end{cases}$$

$$\begin{cases} a_D + a_4 \cos \varphi_4 - a_1 \cos \varphi_1 = 0 \\ a_7 + a_4 \sin \varphi_4 - a_1 \sin \varphi_1 = 0 \end{cases} \quad \begin{cases} -a_4 \sin \varphi_4 \cdot \dot{\varphi}_4 + a_1 \sin \varphi_1 \cdot \dot{\varphi}_1 = 0 \\ \dot{a}_7 + a_4 \cos \varphi_4 \cdot \dot{\varphi}_4 - a_1 \cos \varphi_1 \cdot \dot{\varphi}_1 = 0 \end{cases}$$

$$\dot{\varphi}_4 = \frac{+ a_1 \sin \varphi_1 \cdot \dot{\varphi}_1}{a_4 \sin \varphi_4} = \frac{60 \sin 30^\circ \cdot 50}{180 \sin(145,33)} = 14,65 \frac{\text{deg}}{\text{s}}$$

$$\begin{aligned} \dot{a}_7 &= -a_4 \cos \varphi_4 \cdot \dot{\varphi}_4 + a_1 \cos \varphi_1 \cdot \dot{\varphi}_1 = -180 \cos(145,33) \cdot 14,65 + 60 \cos 30^\circ \cdot 50 = \\ &= \frac{4766,85 \cdot \pi}{180} = 83,2 \frac{\text{mm}}{\text{s}} \end{aligned}$$

$$\begin{cases} a_1 \cos \varphi_1 + a_2 \cos \varphi_2 + a_3 \cos \varphi_3 - a_5 = 0 \\ a_1 \sin \varphi_1 + a_2 \sin \varphi_2 + a_3 \sin \varphi_3 - a_6 = 0 \\ -a_1 \sin \varphi_1 \cdot \dot{\varphi}_1 - a_2 \sin \varphi_2 \cdot \dot{\varphi}_2 - \dot{a}_5 = 0 \\ a_1 \cos \varphi_1 \cdot \dot{\varphi}_1 + a_2 \cos \varphi_2 \cdot \dot{\varphi}_2 = 0 \end{cases}$$

$$\dot{\varphi}_2 = \frac{-a_1 \cos \varphi_1 \cdot \dot{\varphi}_1}{a_2 \cos \varphi_2} = \frac{-60 \cos 30^\circ \cdot 50}{120 \cos(48,6)} = -32,74 \frac{\text{deg}}{\text{s}}$$

$$\begin{aligned} \dot{a}_5 &= a_2 \sin \varphi_2 \cdot \dot{\varphi}_2 + a_1 \sin \varphi_1 \cdot \dot{\varphi}_1 = \\ &= 120 \sin(48,6) \cdot (-32,74) + 60 \sin 30^\circ \cdot 50 = \frac{1443,4 \cdot \pi}{180} = 25,2 \frac{\text{mm}}{\text{s}} \end{aligned}$$

$$PLV: F_E \delta y_E + F_D \delta x_D + Q \delta \varphi_1 = 0$$

$$Q = \frac{-F_E \dot{a}_7 - F_D \dot{a}_5}{\dot{\varphi}_1} = \frac{-600 \cdot 180}{\pi} = -34394,9 \text{ Nmm} = -34,39 \text{ Nm}$$