



$$\sum F_z = 0 = -R + 2q \cdot l - \frac{2}{3} ql \Rightarrow R = \frac{4}{3} ql$$

Ручьям сурового сцену.

Р034:

$$\sum F_{z_1} = 0 = -\frac{4}{3} ql + N_1 \Rightarrow N_1 = \frac{4}{3} ql;$$

$$\sum F_{z_2} = 0 = -\frac{4}{3} ql + 2q \cdot z_2 + N_2 \Rightarrow N_2 = \frac{q}{3} (4l - 6z_2)$$

$$z_2 = 0: N_2 = \frac{4}{3} ql$$

$$z_2 = l: N_2 = -\frac{2}{3} ql$$

$$\sum F_{z_3} = 0 = -\frac{4}{3} ql + 2q \cdot l + N_3 \Rightarrow N_3 = -\frac{2}{3} ql$$

$$\sigma_1 = \frac{N_1}{A_1} = \frac{\frac{4}{3} ql}{2A} = \frac{2}{3} \frac{ql}{A};$$

$$\sigma_2 = \frac{N_2}{A_2} = \frac{\frac{q}{3} (4l - 6z_2)}{2A} = \frac{q(4l - 6z_2)}{6A} \left\{ \begin{array}{l} z_2=0: \sigma_2 = \frac{2ql}{3A} \\ z_2=l: \sigma_2 = -\frac{ql}{3A} \end{array} \right.$$

$$\sigma_3 = \frac{N_3}{A_3} = \frac{-\frac{2}{3} ql}{A} = -\frac{2ql}{3A};$$

$$\epsilon_1 = \frac{\sigma_1}{E_1} = \frac{2}{3} \frac{ql}{EA};$$

$$\epsilon_2 = \frac{\sigma_2}{E_2} = \frac{q(4l - 6z_2)}{6EA} \left\{ \begin{array}{l} z_2=0: \epsilon_2 = \frac{2ql}{3EA} \\ z_2=l: \epsilon_2 = -\frac{ql}{3EA} \end{array} \right.$$

$$\epsilon_3 = \frac{\sigma_3}{E_3} = -\frac{2}{3} \frac{ql}{EA};$$

$$W_1 = W_0^{кон} + \int_0^{z_1} \epsilon_1 dz_1 = \int_0^{z_1} \frac{2}{3} \frac{ql}{EA} dz_1 = \frac{2}{3} \frac{ql}{EA} \cdot z_1;$$

$$z_1 = 0: W_1^{кон} = 0;$$

$$z_1 = l: W_1^{кон} = \frac{2}{3} \frac{ql^2}{EA};$$

$$W_2 = W_1^{\text{кон}} + \int_0^{z_2} \varepsilon_2 dz_2 = \frac{2}{3} \cdot \frac{ql^2}{EA} + \int_0^{z_2} \frac{q}{6EA} (4l - 6z_2) dz_2 =$$

$$= \frac{2}{3} \cdot \frac{ql^2}{EA} + \frac{2}{3} \cdot \frac{ql}{EA} \int_0^{z_2} dz_2 - \frac{q}{EA} \int_0^{z_2} z_2 dz_2 =$$

$$= \frac{q}{EA} \left[\frac{2}{3} l^2 + \frac{2}{3} l z_2 - \frac{z_2^2}{2} \right] = \frac{q}{6EA} [4l^2 + 4l z_2 - 3z_2^2];$$

$$z_2 = 0 : W_2^{\text{нар}} = \frac{4}{6} \cdot \frac{ql^2}{EA} = \frac{2}{3} \cdot \frac{ql^2}{EA};$$

$$z_2 = l : W_2^{\text{кон}} = \frac{5}{6} \cdot \frac{ql^2}{EA};$$

$$W_3 = W_2^{\text{кон}} + \int_0^{z_3} \varepsilon_3 dz_3 = \frac{5}{6} \cdot \frac{ql^2}{EA} - \int_0^{z_3} \frac{2}{3} \cdot \frac{ql}{EA} dz_3 = \frac{5}{6} \frac{ql^2}{EA} - \frac{2}{3} \frac{ql}{EA} z_3 =$$

$$= \frac{ql}{6EA} [5l - 4z_3];$$

$$z_3 = 0 : W_3^{\text{нар}} = \frac{5}{6} \cdot \frac{ql^2}{EA};$$

$$z_3 = l : W_3^{\text{кон}} = \frac{ql}{6EA} [5l - 4l] = \frac{1}{6} \cdot \frac{ql^2}{EA};$$

На второй участе эпюра ε пересекает ось. Значит,

в этой точке экстремум эпюры W :

$$\varepsilon_2(z_2^*) = 0 = \frac{q}{6EA} [4l - 6z_2^*] \Rightarrow z_2^* = \frac{2}{3} l$$

$$W_2(z_2^*) = W_2\left(\frac{2}{3}l\right) = \frac{q}{6EA} [4l^2 + 4l\left(\frac{2}{3}l\right) - 3\left(\frac{2}{3}l\right)^2] = \frac{8}{9} \frac{ql^2}{EA}$$