

Дано: l, G, d, M

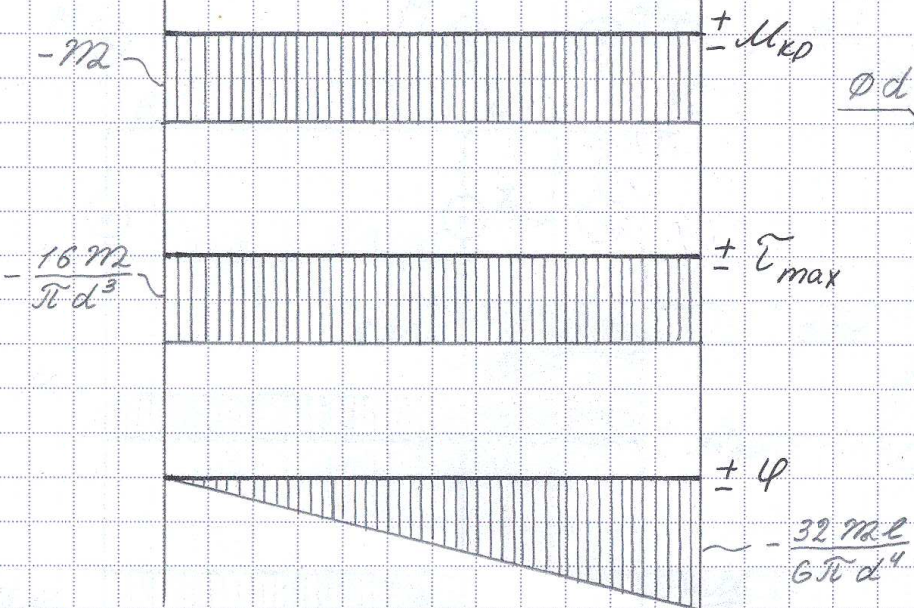
Найти: M_{KP}
 τ_{max}
 φ
 W и U

$$\sum M_z = 0 = -M_{RA} - M$$

$$M_{RA} = -M$$

$$\sum M_{y1} = 0 = M + M_{KP1}$$

$$M_{KP1} = -M$$



$$J_{K1} = J_{P1} = \frac{\pi d^4}{32}$$

$$W_{K1} = W_{P1} = \frac{\pi d^3}{16}$$

$$\tau_{max1} = \frac{M_{KP1}}{W_{P1}} = -\frac{M \cdot 16}{\pi d^3}$$

$$z_1 = 0: \varphi_1^{кон} = 0$$

$$\varphi_1 = \varphi_0^{кон} + \int_0^{z_1} \frac{M_{KP1}}{G J_{P1}} dz_1 = - \int_0^{z_1} \frac{M \cdot 32}{G \pi d^4} dz_1 = -\frac{32 M z_1}{G \pi d^4}$$

$$z_1 = l: \varphi_1^{кон} = -\frac{32 M l}{G \pi d^4}$$

$$W = \sum \frac{1}{2} M_i \varphi_i = \frac{1}{2} M_B \varphi_B = \frac{1}{2} (-M) \left(-\frac{32 M l}{G \pi d^4} \right) = \frac{16 M^2 l}{G \pi d^4}$$

$$U = \sum \frac{M_{KP1}^2 l_i}{2 G J_{P1}} = \frac{M_{KP1}^2 l}{2 G J_{P1}} = \frac{(-M)^2 l \cdot 32}{2 G \pi d^4} = \frac{16 M^2 l}{G \pi d^4}$$

} $W = U$