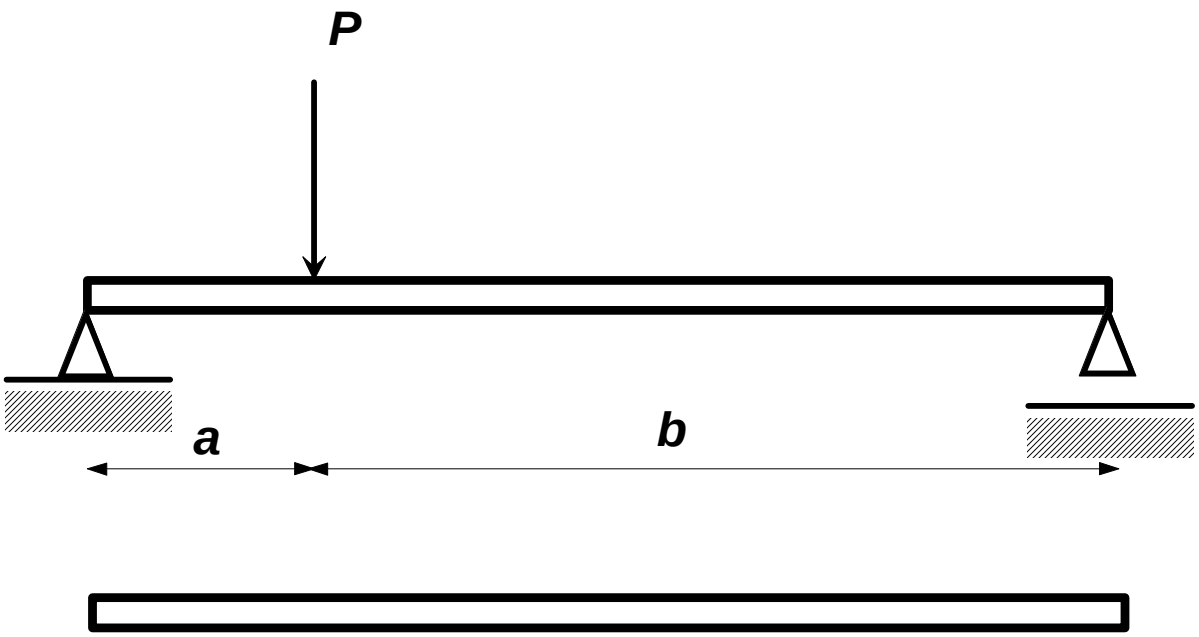


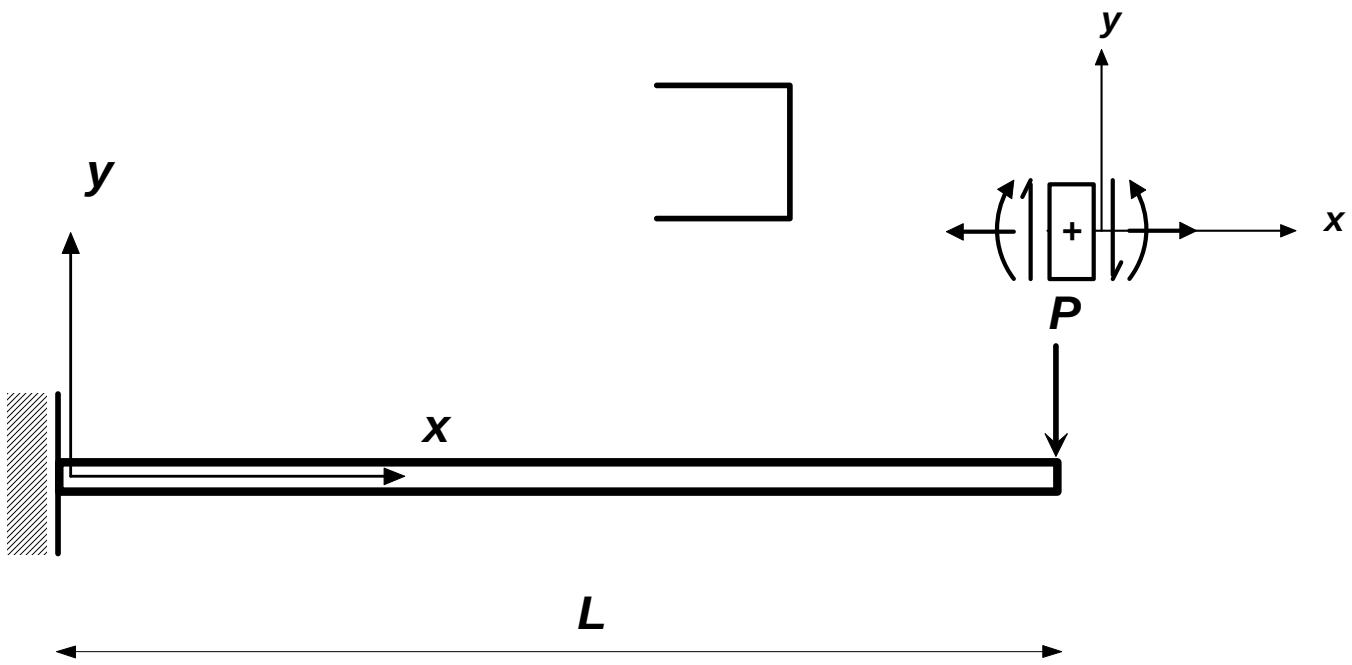


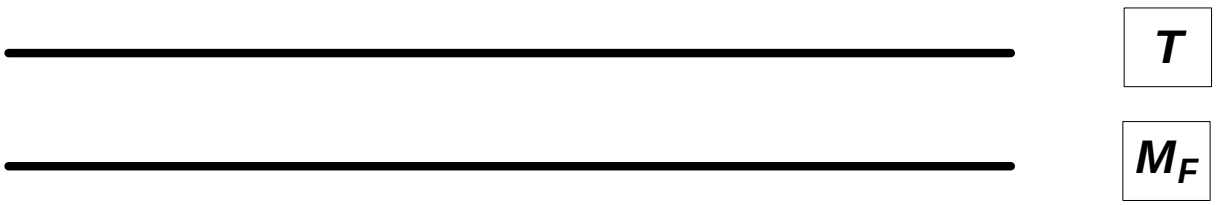


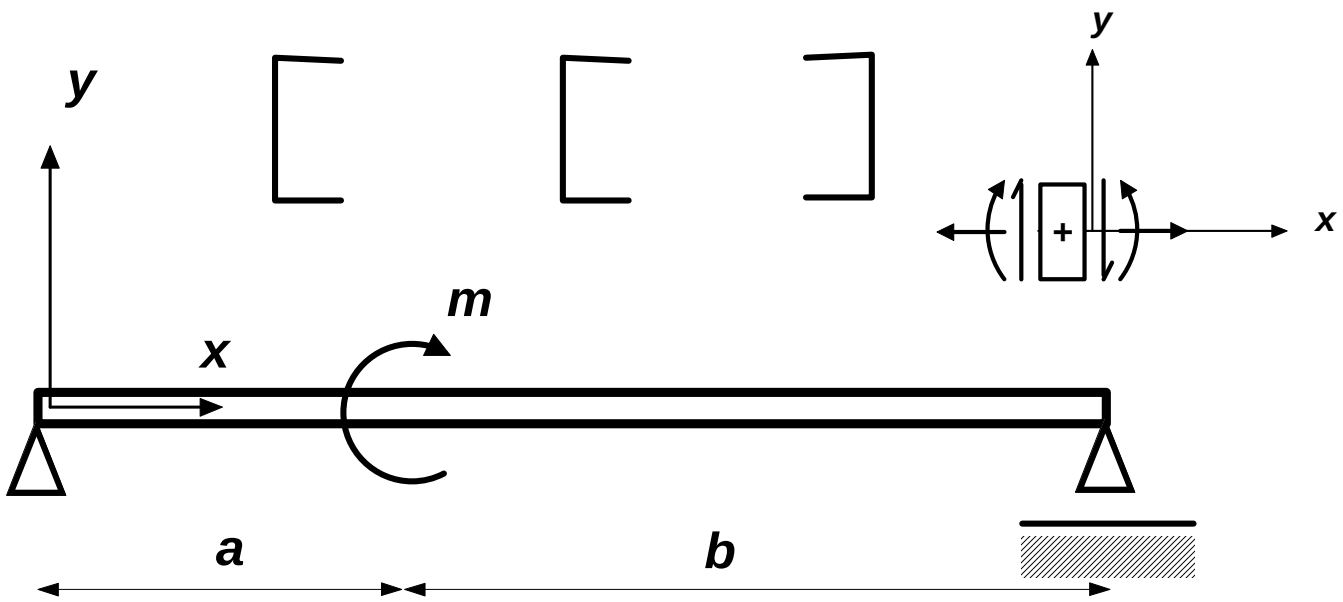

T

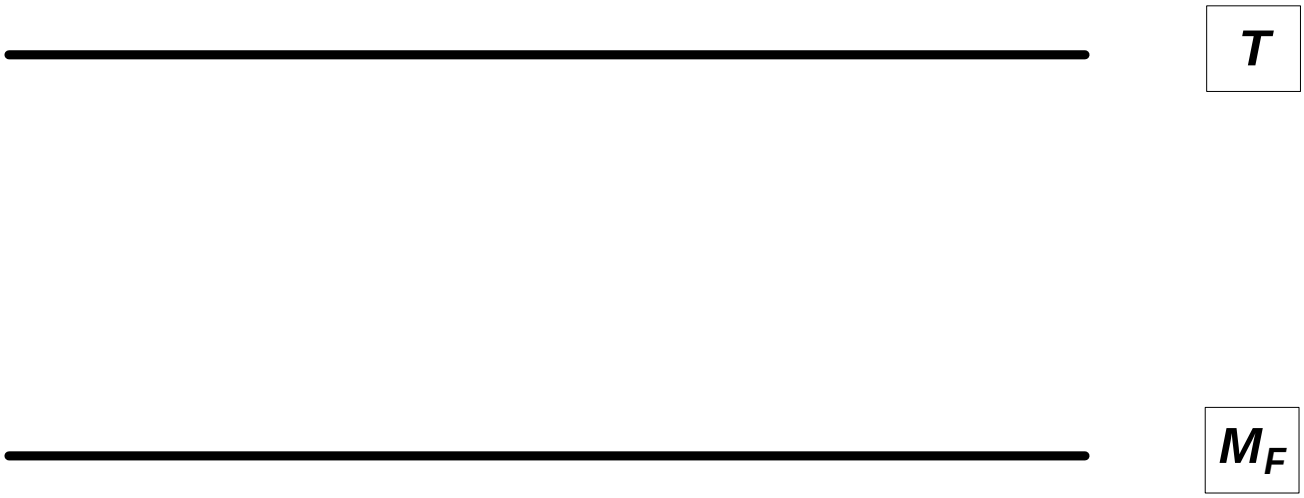


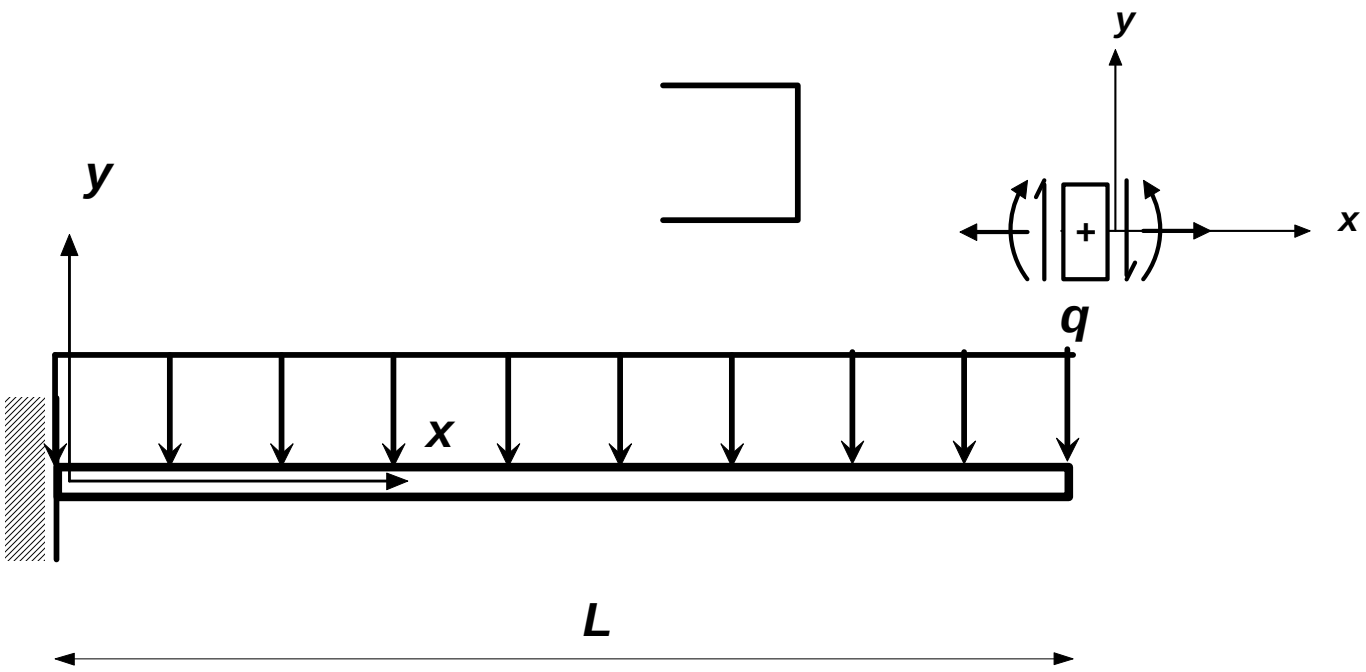
$M_F$

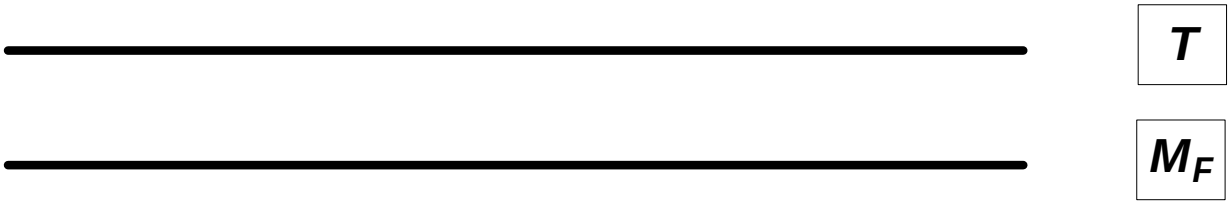

y
x
P
y
x
L

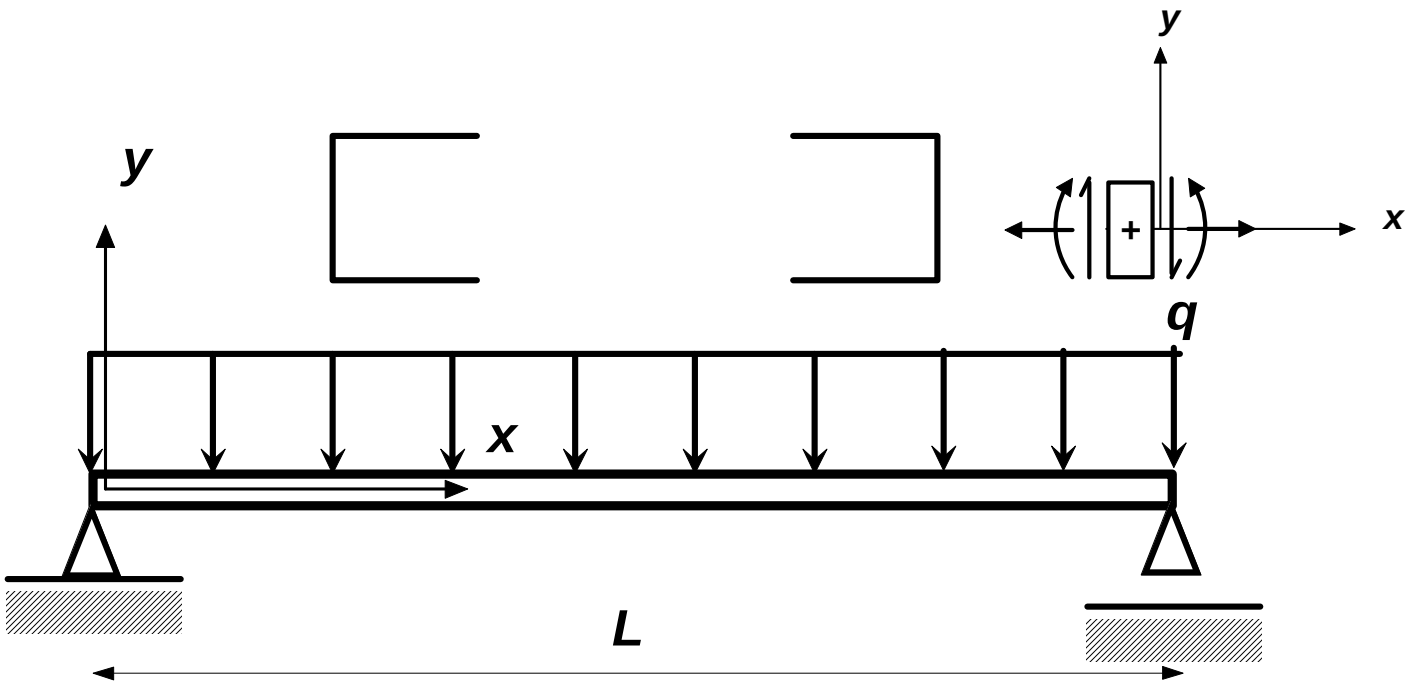

T
$M_F$


y
y
x
+
m
x
a
b


T
$M_F$

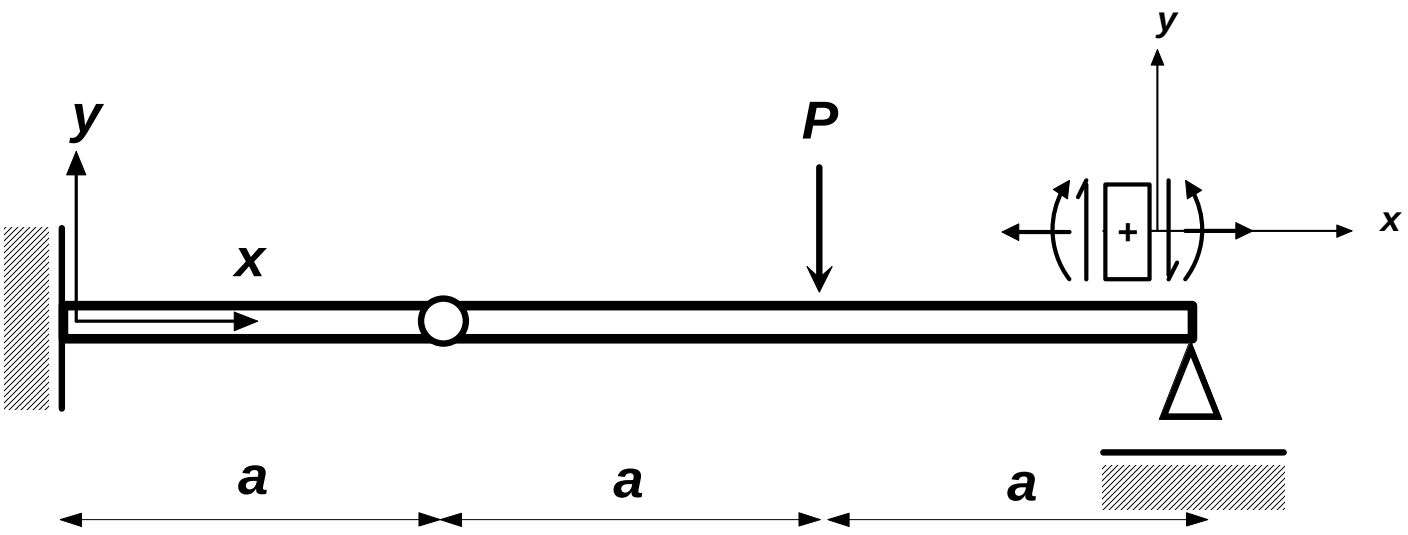

y
x
+
y
q
x
L


T
$M_F$




T

$M_F$

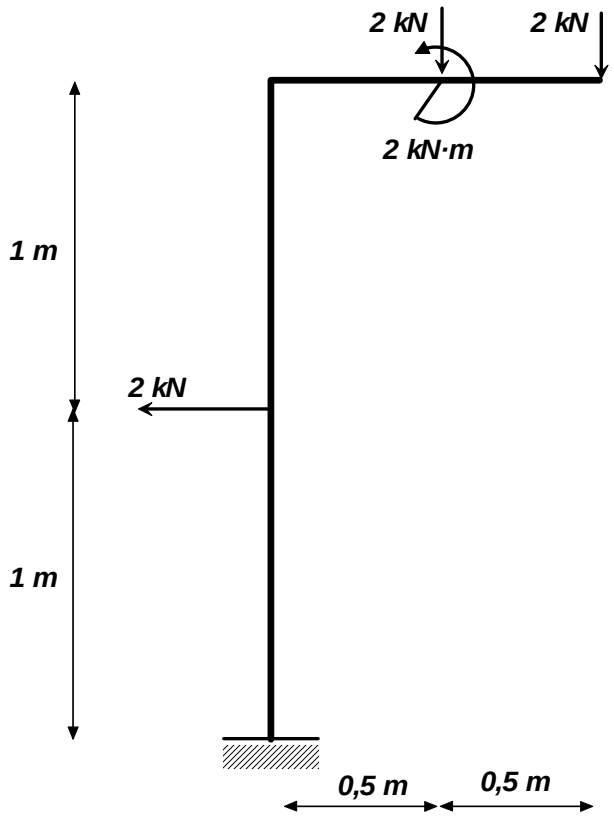


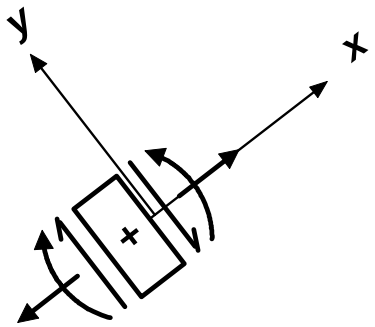


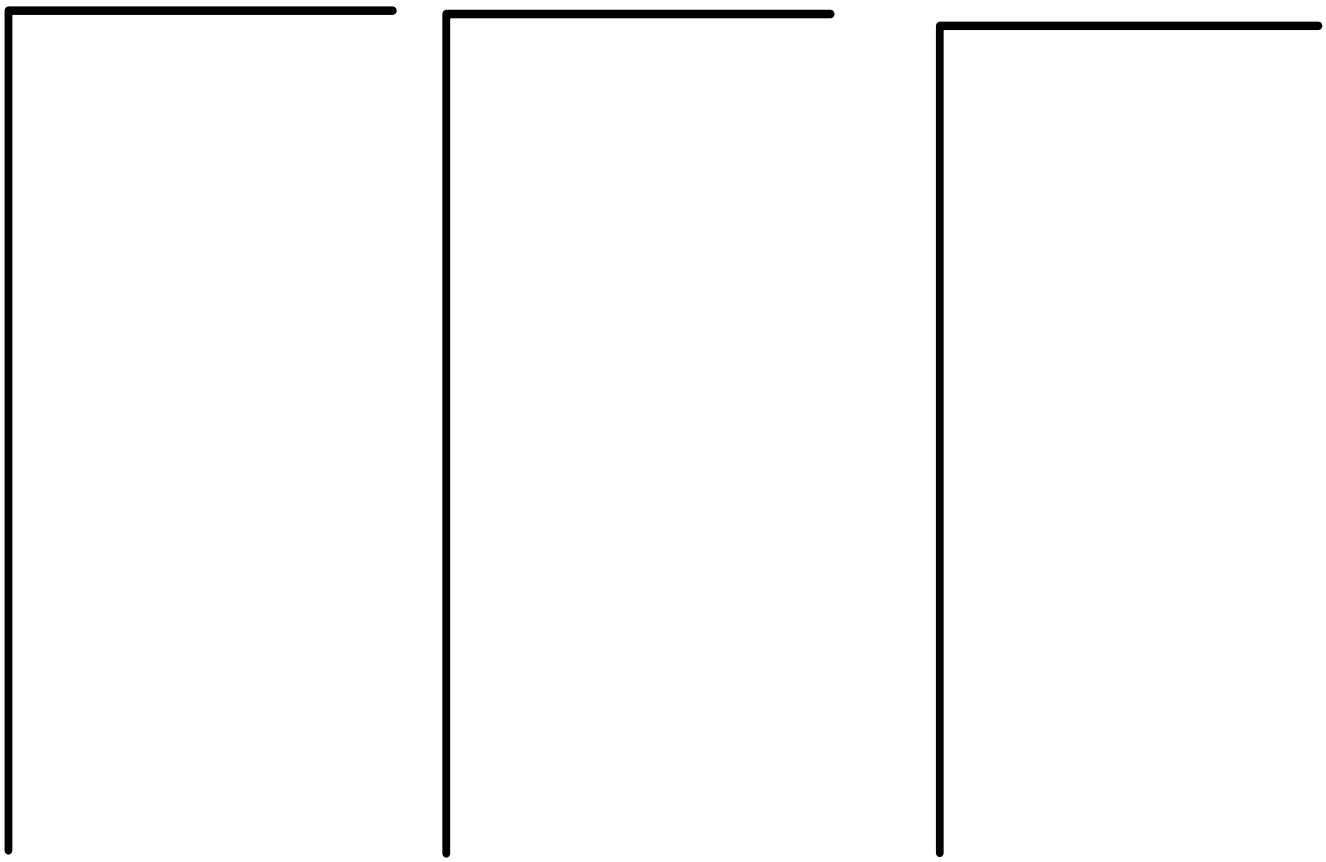

**T**



**$M_F$**



**N**

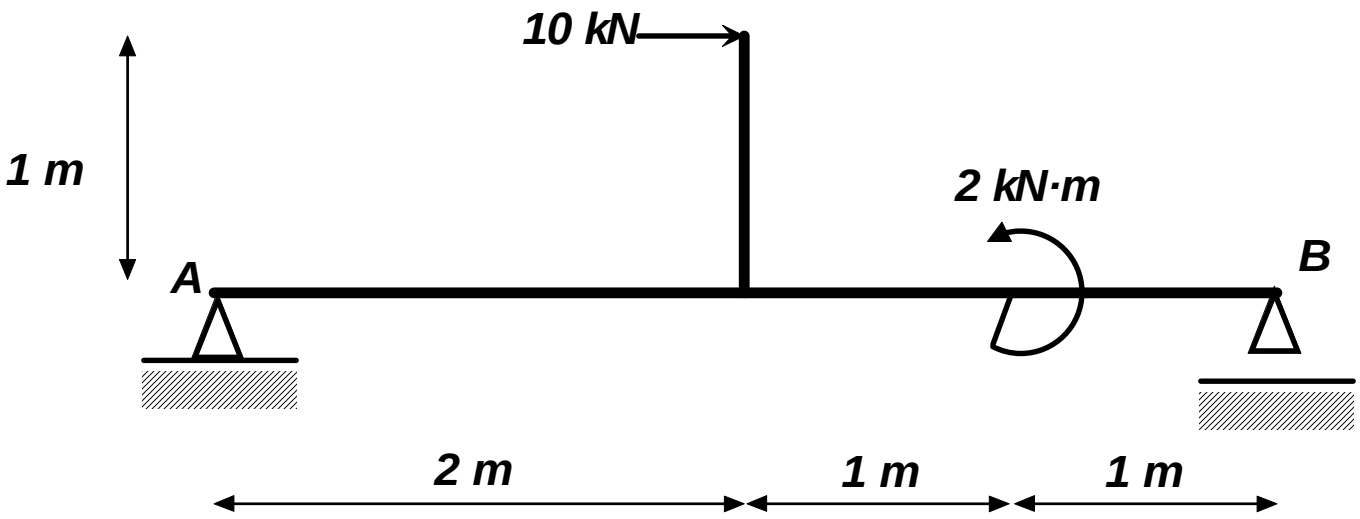
**(kN)**

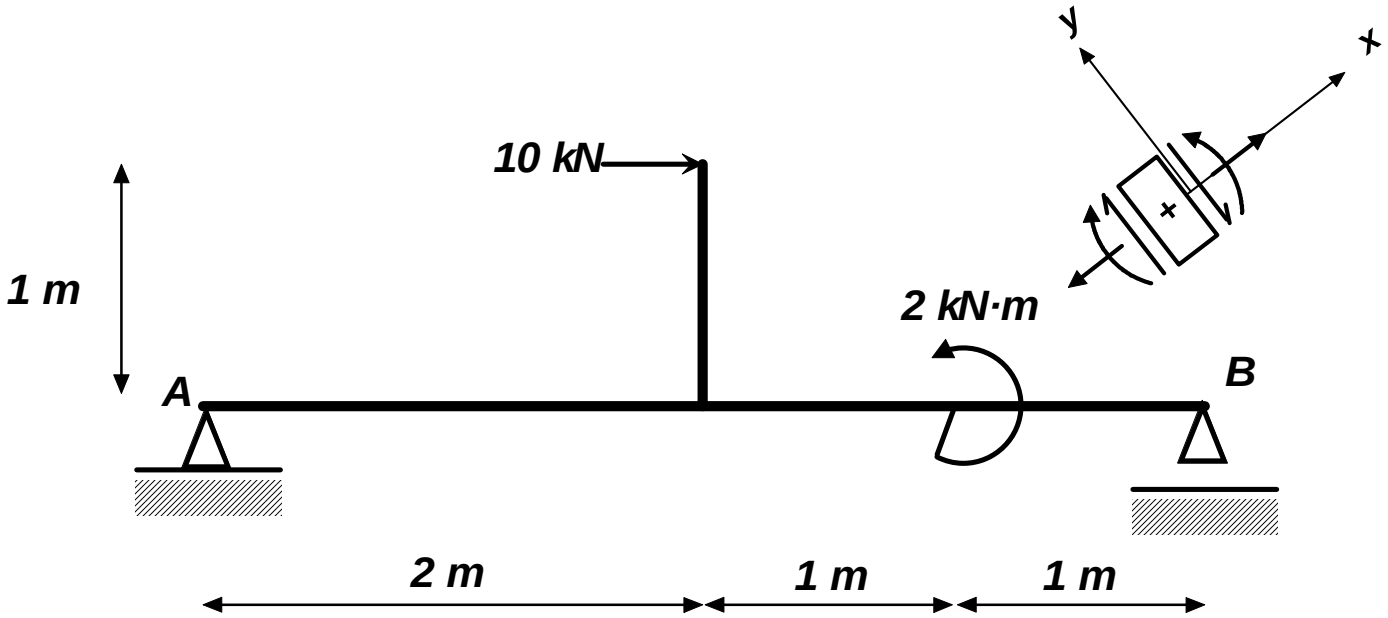
**T**

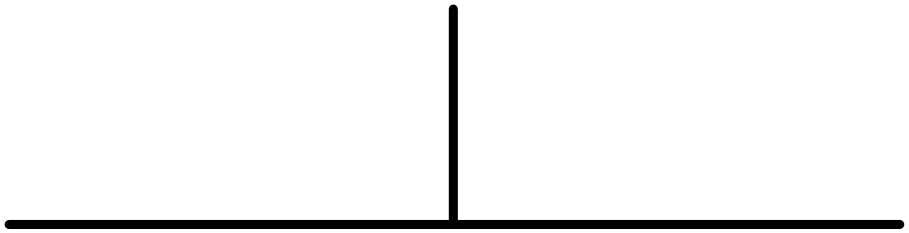
**(kN)**

**$M_F$**

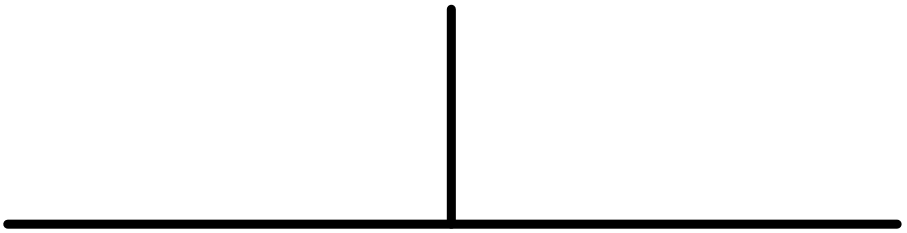
**(kN·m)**


10 kN
1 m
2 kN·m
A
B
2 m
1 m
1 m

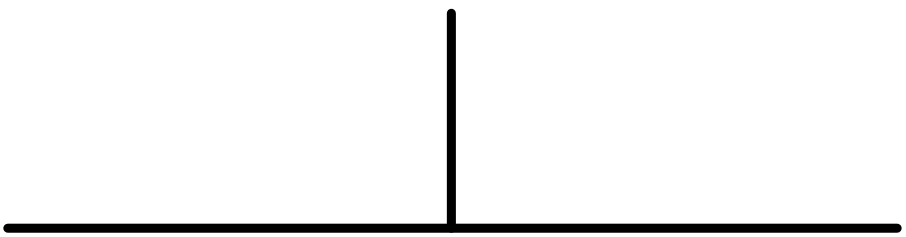


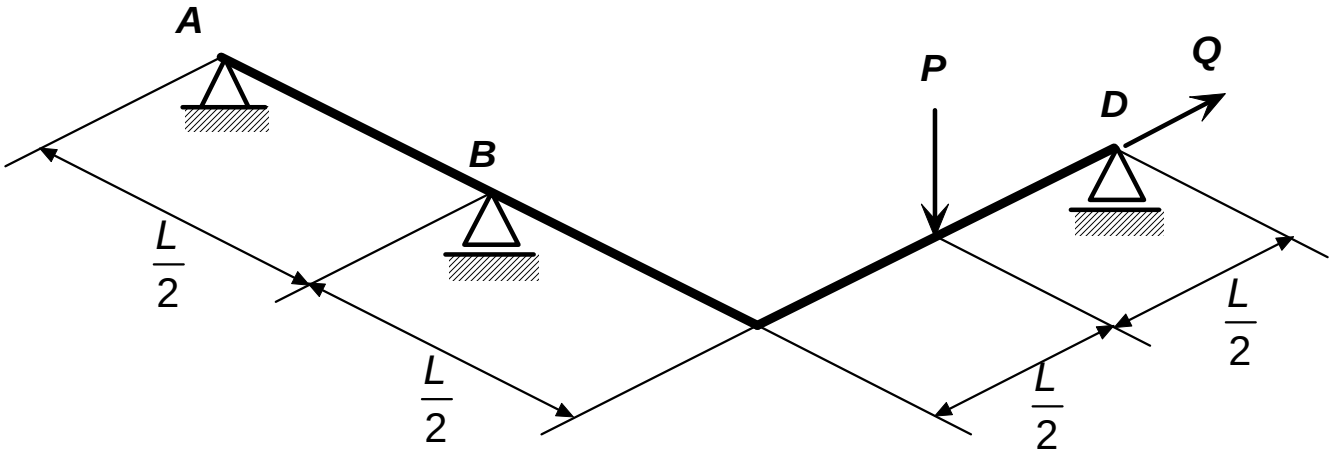
N
(kN)



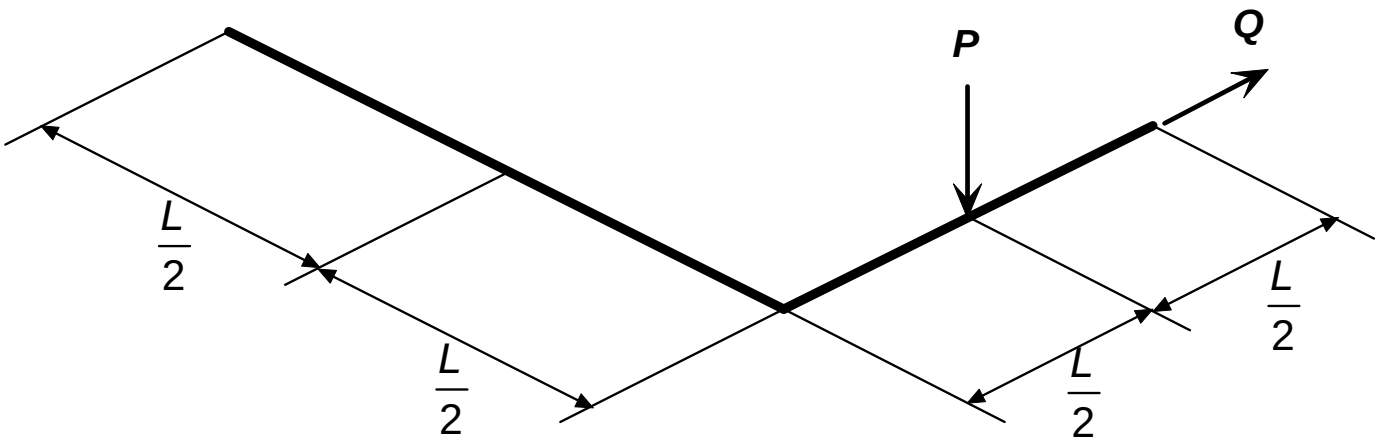
T
(kN)



$M_F$
(kN·m)




A: No permite los desplazamientos según X, Y, Z.
B: No permite los desplazamientos según X, Z.
D: No permite el desplazamiento según Z.



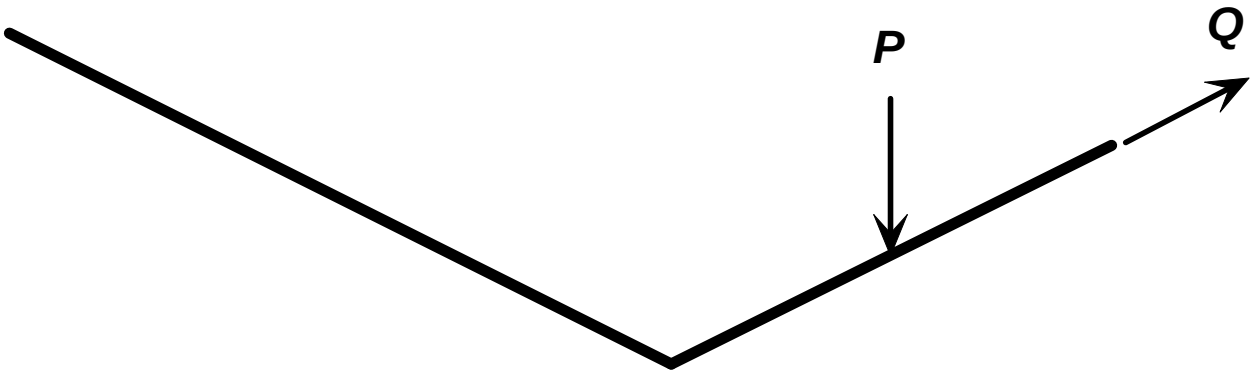

$$\sum F_X = 0 \quad \rightarrow \quad R_{AX} + R_{BX} - Q = 0$$
$$\sum F_Y = 0 \quad \rightarrow \quad R_{AY} = 0$$
$$\sum F_Z = 0 \quad \rightarrow \quad R_{AZ} + R_{BZ} + R_{DZ} - P = 0$$

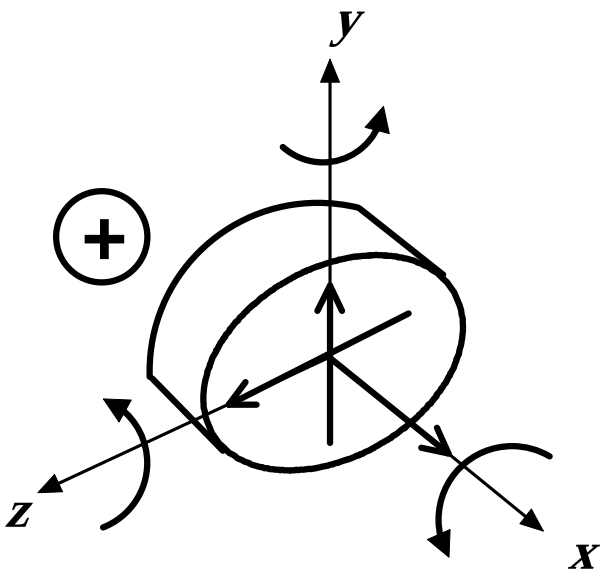
$$\sum_A M_X = 0 \quad \rightarrow$$

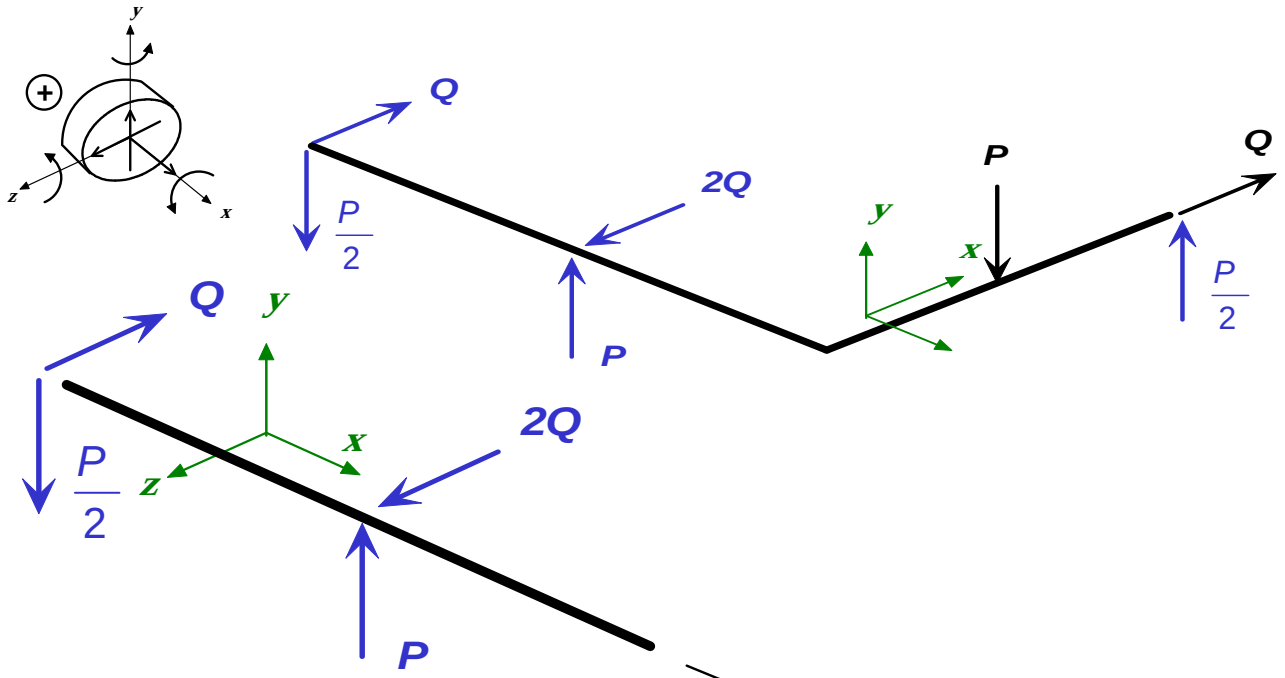
$$\sum_A M_Y = 0 \quad \rightarrow$$

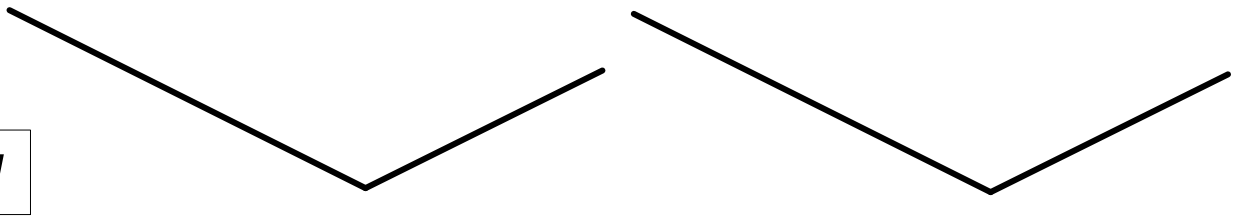
$$\sum_A M_Z = 0 \quad \rightarrow$$

$$\sum_A \vec{M} = \vec{0} \quad \rightarrow \quad \sum_i \vec{r}_i \times \vec{F}_i = \vec{0} \quad \rightarrow \quad \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 0 & \frac{L}{2} & 0 \\ R_{BX} & 0 & R_{BZ} \end{vmatrix} + \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -\frac{L}{2} & L & 0 \\ 0 & 0 & -P \end{vmatrix} + \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -L & -L & 0 \\ -Q & 0 & R_{DZ} \end{vmatrix} = \vec{0}$$



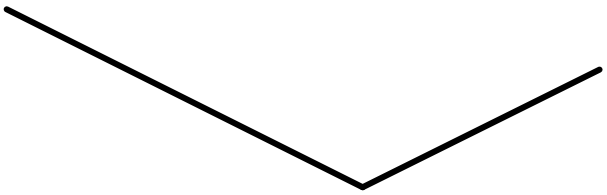


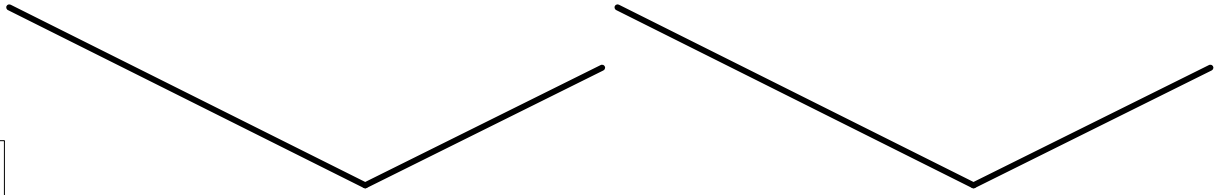
**N**
**(kN)**



**$T_y$**
**(kN)**



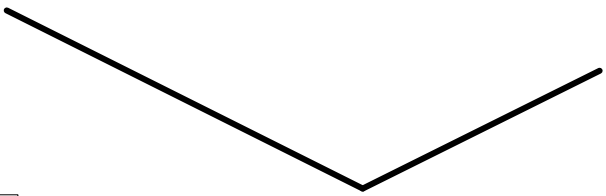
**$T_z$**
**(kN)**



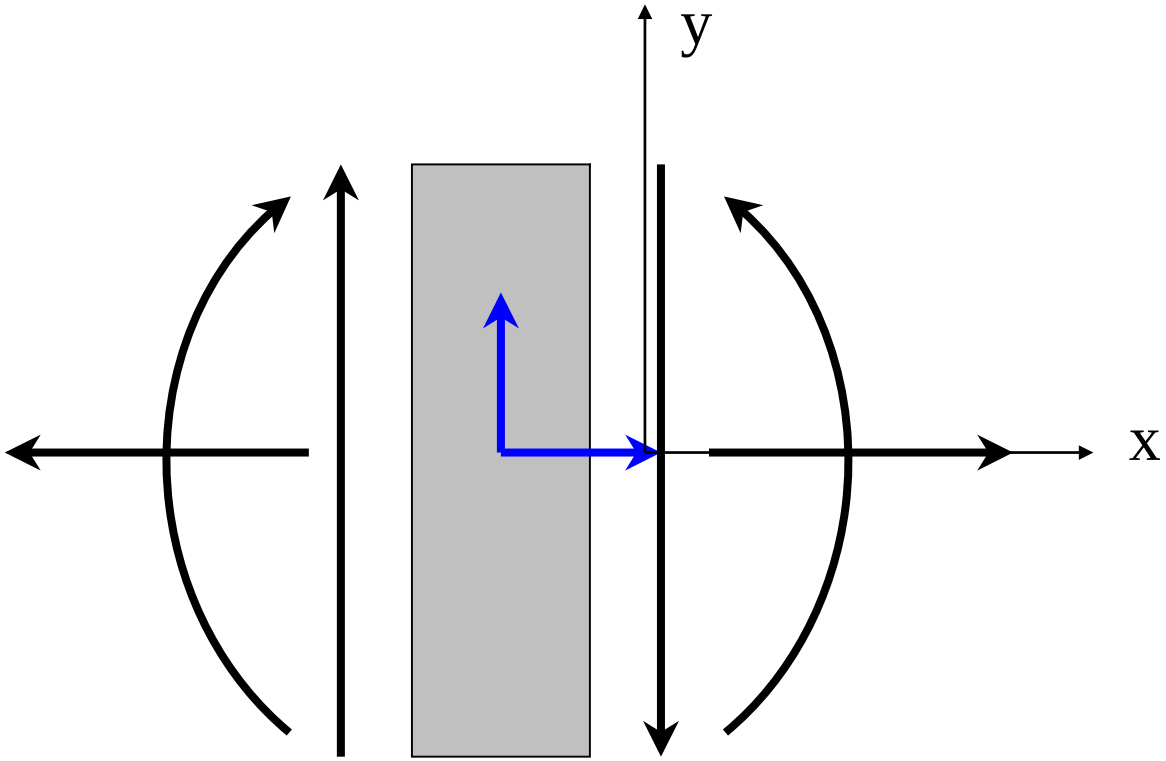
**$M_T$**
**(kN·m)**



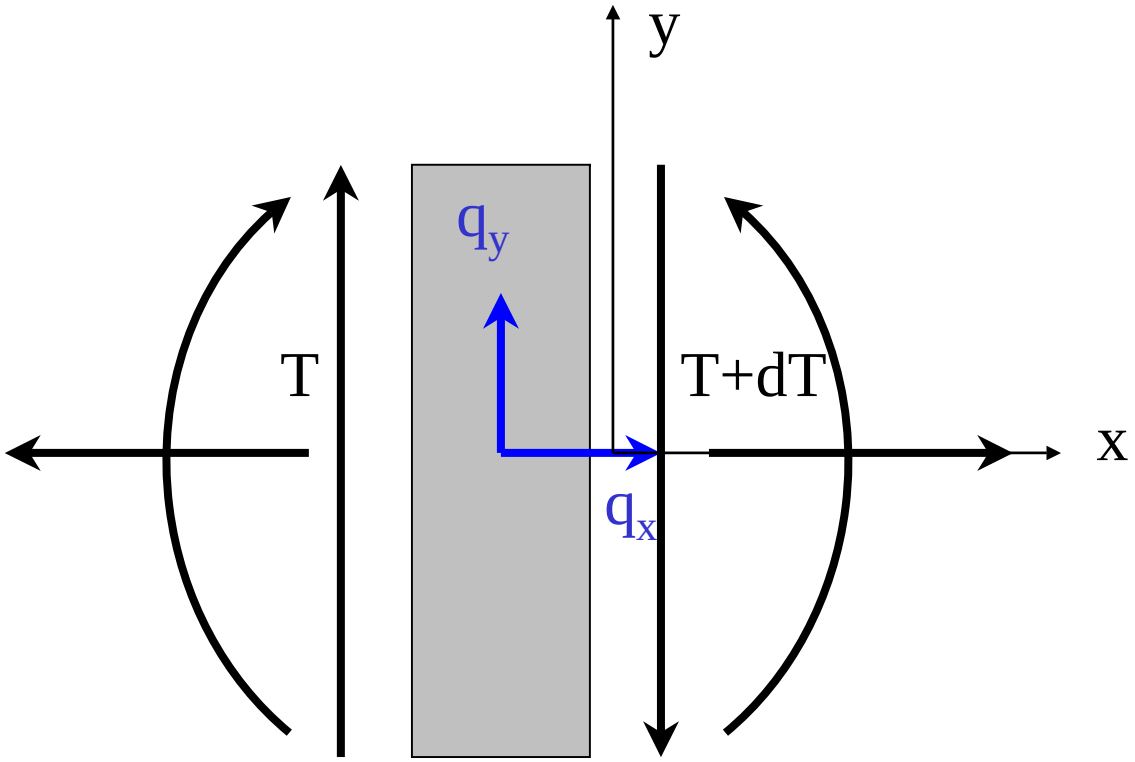
**$M_y$**
**(kN·m)**



**$M_z$**
**(kN·m)**



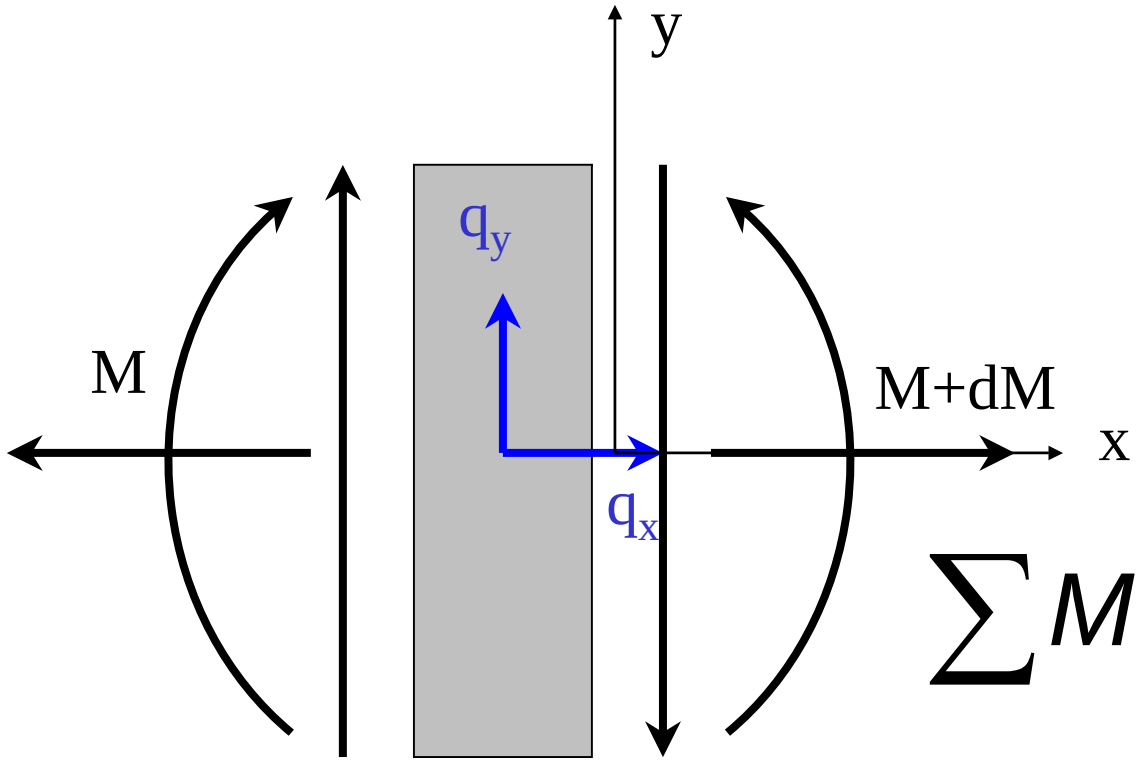

$$\sum F_x = 0 \quad \rightarrow$$




$$\sum F_y = 0 \quad \rightarrow \quad T - T - dT + q_y dx = 0$$

$$dT = q_y dx$$

$$T(x) = T(0) + \int_0^x q_y dx$$




$$\sum M_{z\,centro} = 0 \quad \rightarrow$$

$$-M - T\frac{dx}{2} + M + dM - (T + dT)\frac{dx}{2} = 0$$

$$dM = T dx$$

$$M(x) = M(0) + \int_0^x T dx$$