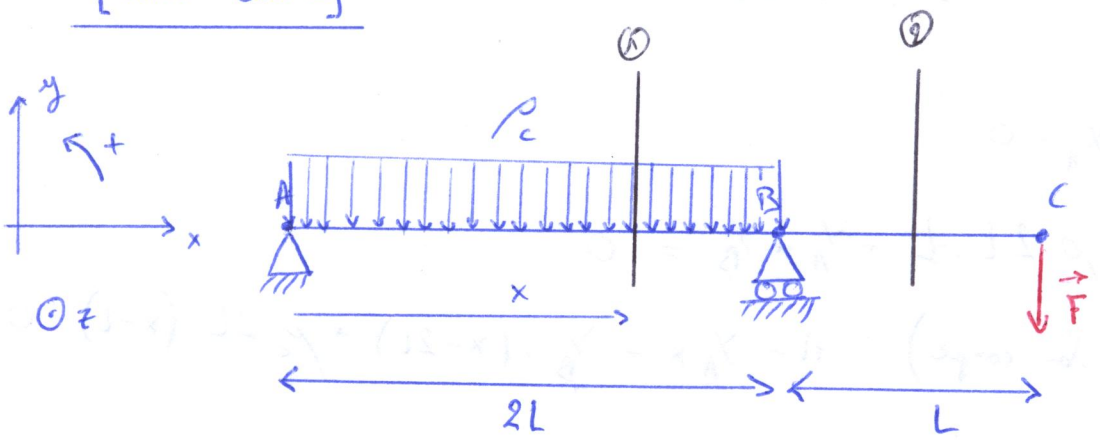
[sdm - 000 9]



① $h = 2 + 1 - 3 \times 1 = 0$ ⇒ Isostatique

② PFS

$$\begin{cases} X_A = 0 \\ Y_A + Y_B - 2\rho_c L - F = 0 \\ (\text{en A}) : \quad 2L Y_B - 3LF - L.\rho_c 2L = 0 \end{cases}$$

Donc,

$$\begin{cases} X_A = 0 \\ Y_B = \frac{3}{2} F + L\rho_c \\ Y_A = -\frac{1}{2} F + \rho_c L \end{cases}$$

③ 2 coupes

④ 1ère coupe : $0 \leq x \leq 2L$

$$\begin{cases} N + X_A = 0 \\ T + Y_A - \rho_c x = 0 \\ (\text{à la coupe}) \quad M - Y_A x + \rho_c . x . \frac{x}{2} = 0 \end{cases}$$

Donc

$$\begin{cases} N = 0 \\ T = \frac{1}{2} F + \rho_c (x - L) = \rho_c x + \frac{F}{2} - \rho_c L \\ M = -\frac{1}{2} F x + \rho_c x \left(L - \frac{x}{2}\right) = -\rho_c \frac{x^2}{2} + x\left(\rho_c L - \frac{F}{2}\right) \end{cases}$$

2ème coupe : $L \leq x \leq 2L$

$$\begin{cases} N + X_A = 0 \\ T - \rho_c 2L + Y_A + Y_B = 0 \\ \text{(à la coupe)} : \quad M - Y_A x - Y_B \cdot (x-2L) + \rho_c 2L\,(x-L) = 0 \end{cases}$$

Donc $\boxed{N = 0}$

$$T = 2\rho_c L^2 - Y_A - Y_B$$
$$= 2\rho_c L - 2\rho_c L - F$$
$$\boxed{T = -F}$$

$$M = Y_A x + Y_B (x-2L) - \rho_c 2L(x-L)$$
$$= \rho_c 2L(L-x) + \left(-\tfrac{1}{2}F + \rho_c L\right)x + \left(\tfrac{3}{2}F + \rho_c L\right)(x-2L)$$
$$= \cancel{\rho_c 2L^2} - \cancel{\rho_c 2Lx} - \tfrac{1}{2}Fx + \cancel{\rho_c Lx} + \tfrac{3}{2}Fx - 3FL + \cancel{\rho_c Lx} - \cancel{2\rho_c L^2}$$
$$= Fx - 3FL$$
$$\boxed{M = F(x-3L)}$$