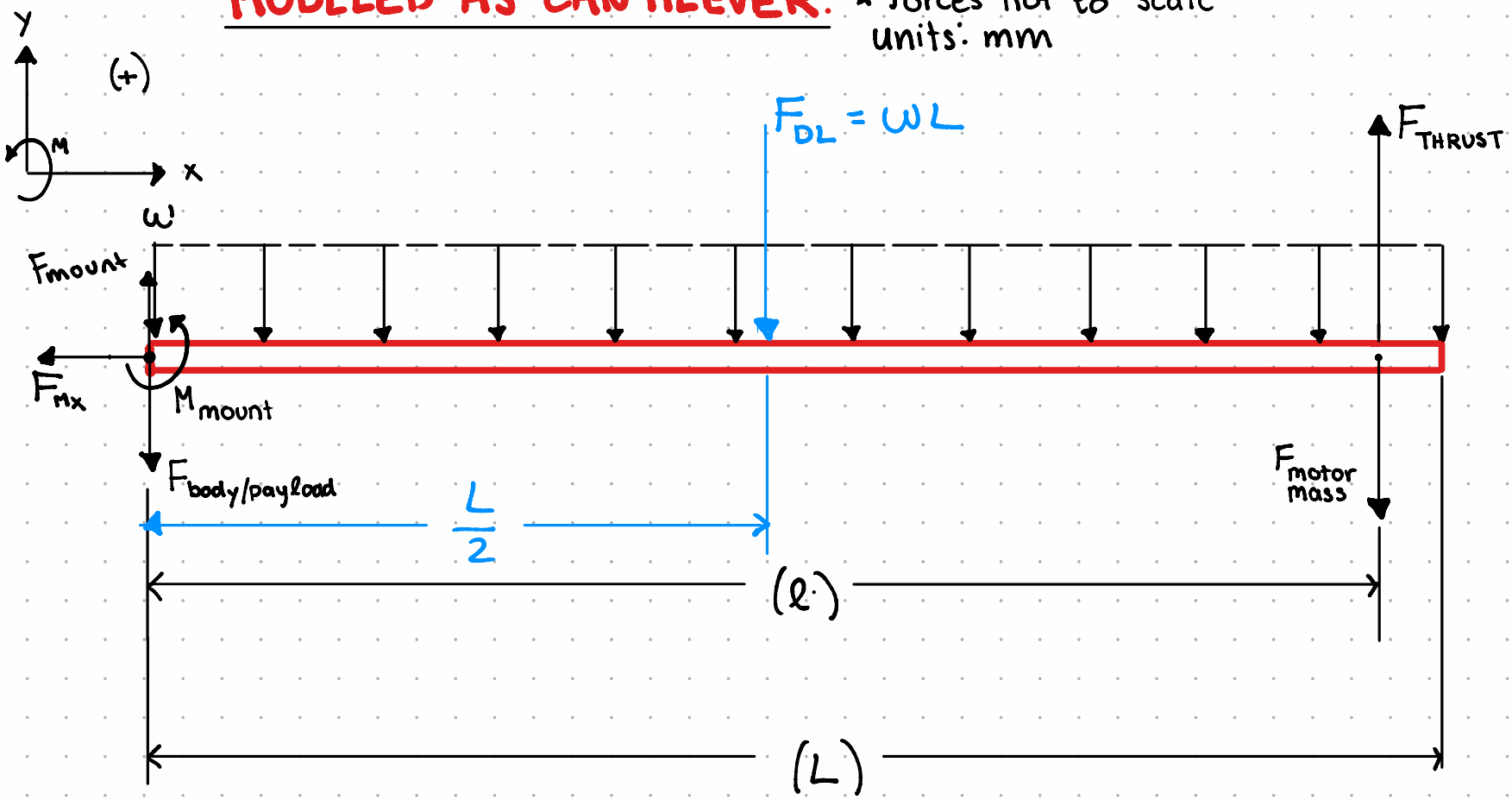
MODELED AS CANTILEVER:

* forces not to scale
units: mm



$$\Sigma F_y = 0$$

$$F_{mount} - \omega L - F_{motor\ mass} + F_{Thrust} - F_{body/payload} = 0$$

$$\Sigma F_x = 0$$

$$F_{Mx} = 0$$

$$\Sigma M_A = 0$$

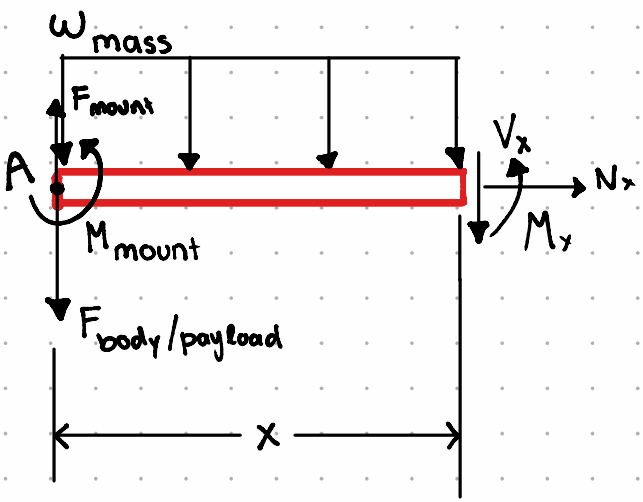
$$M_{mount} - \omega L\left(\frac{L}{2}\right) + F_{Thrust}\,\ell - F_{motor\ mass}\cdot\ell = 0$$

$$F_{mount} = \omega L + F_{motor\ mass} - F_{thrust} + F_{body/payload}$$

$$M_{mount} = \frac{1}{2}\omega L^2 - \ell\left(F_{Thrust} - F_{motor\ mass}\right)$$

Shear and moment equations

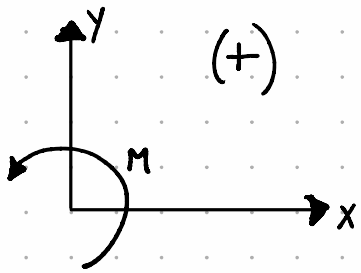
$0 < x < \ell$



$\Sigma F_y = 0$

$-V_x + F_{mount} - F_{body/payload} - \omega x$

$$V_x = F_{mount} - F_{body/payload} - \omega x = 0$$



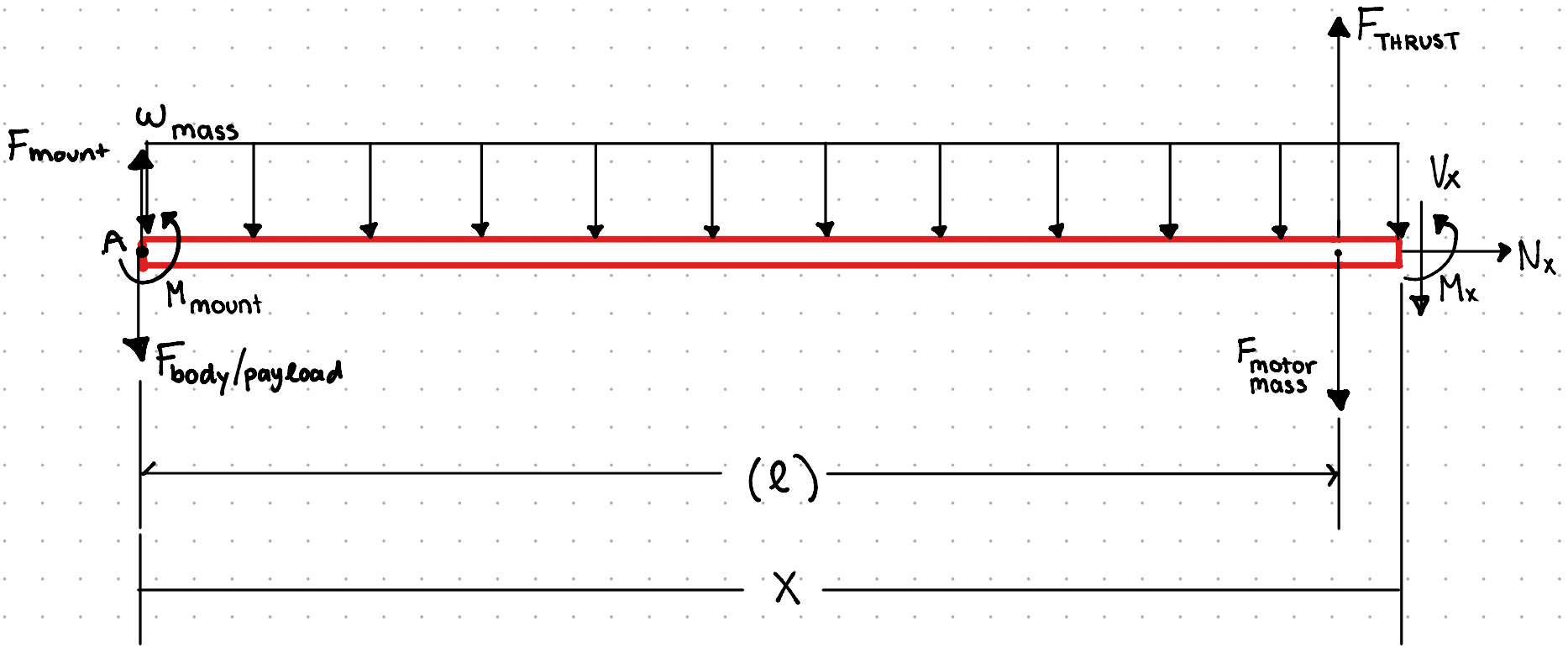
$\Sigma F_x = 0$

$N_x = 0$

$\Sigma M_{cut} = 0$

$M_x - F_{mount}(x) + \omega x(0.5x) + M_{mount} + F_{body/payload}\, x = 0$

$$M_x = -\tfrac{1}{2}\omega x^2 + (F_{mount} - F_{body/payload})x - M_{mount} \quad (0 < x < \ell)$$



$\ell < x < L$ $\quad \Sigma F_x = 0$

$N_x = 0$

$\Sigma F_y = 0$

$$F_{mount} - F_{body/payload} - wx - F_{\substack{motor \\ mass}} + F_{Thrust} - V_x = 0$$

$$V_x = F_{mount} - F_{body/payload} - wx - F_{\substack{motor \\ mass}} + F_{Thrust}$$

$$\Sigma M_{cut} = 0$$

$$M_x + M_{mount} - F_{mount}\,X + F_{\substack{motor\\mass}}\,(X-\ell) - F_{Thrust}\,(x-\ell) + wX\left(\tfrac{1}{2}x\right) + F_{body/payload}\,X = 0$$

$$M_x = (x-\ell)\left(F_{Thrust} - F_{\substack{motor\\mass}}\right) - M_{mount} + F_{mount}\,X - \tfrac{1}{2}wx^2 - F_{body/payload}X = 0$$

$$\ell < x < L$$