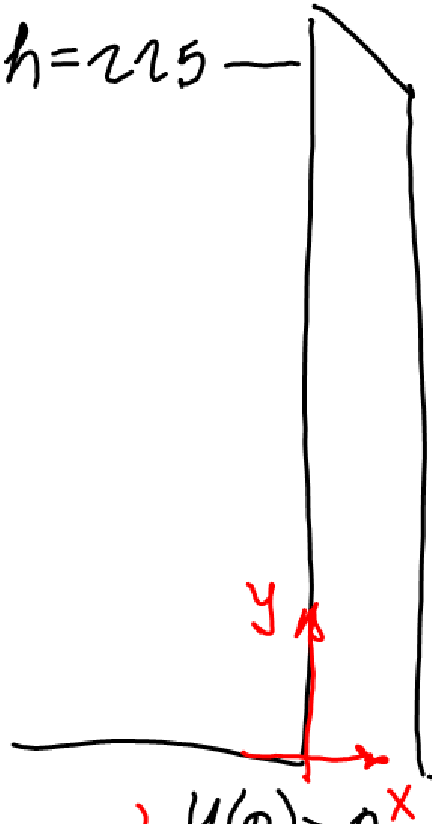
Aplicación: Transformada de Laplace.

La torre mayor

piso = 55 $h = 225$



$$y(t_f) = 225 \text{ [m]}$$

$$y'(t_f) = 0 \qquad y''(t_f) = 0$$

$$\text{Sacudida} = \leq 1.6 \frac{ft}{s^3} = 0{,}49 \frac{m}{s^3}$$

$$\frac{d^3y}{dt^3} = S(t)$$

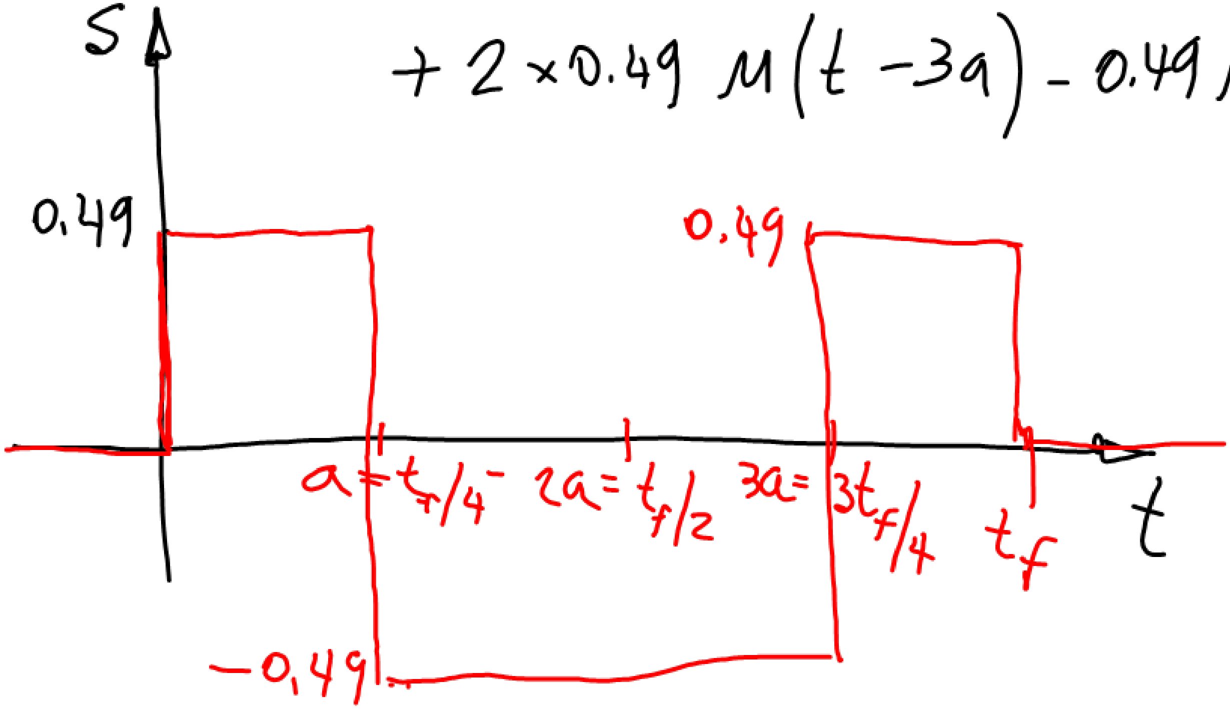
$t_f \Rightarrow$ tiempo final.

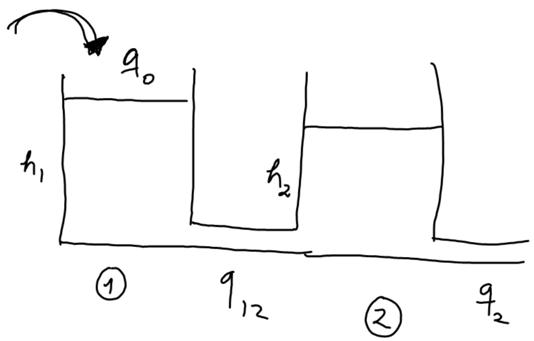
$$y(0) = 0$$

$$y'(0) = 0 \qquad y''(0) = 0$$

$$a = \frac{t_f}{4}$$

$$s(t) \Rightarrow 0.49\,\mu(t) - 2\times 0.49\,\mu(t-a) + $$
$$+ 2\times 0.49\,\mu(t-3a) - 0.49\,\mu(t-4a)$$





$V_1 = A_1 h_1 \qquad q_{12} = k_1 (h_1 - h_2)$

$V_2 = A_2 h_2 \qquad q_2 = k_2 h_2$

$A_1 = 1$

$A_2 = 8$

$q_0 = 5\ l/seg \quad k_1 = \frac{4}{3} \quad k_2 = 12$

$\frac{dV_1}{dt} = q_0 - q_{12}$ tanque 1.

$$\frac{dA_1 h_1}{dt} = 5 - \frac{4}{3}(h_1 - h_2)$$

$$\longrightarrow \frac{dh_1}{dt} = 5 - \frac{4}{3}(h_1 - h_2)$$

$$\frac{dV_2}{dt} = q_{12} - q_2$$

$$\frac{dA_2 h_2}{dt} = \frac{4}{3}(h_1 - h_2) - 12 h_2$$

$$\longrightarrow \frac{dh_2}{dt} = \frac{4}{24}(h_1 - h_2) - \frac{12}{8} h_2$$

$$\frac{d}{dt}\underbrace{\begin{bmatrix} h_1 \\ h_2 \end{bmatrix}}_{\bar{h}(t)} = \underbrace{\begin{bmatrix} -\frac{4}{3} & \frac{4}{3} \\ \frac{4}{24} & -\frac{40}{24} \end{bmatrix}}_{A} \underbrace{\begin{bmatrix} h_1 \\ h_2 \end{bmatrix}}_{\bar{h}(t)} + \underbrace{\begin{bmatrix} 5 \\ 0 \end{bmatrix}}_{\bar{b}(t)}$$

$$e^{At}$$

$$\bar{h}(t) = e^{At}\bar{h}(0) + \int_0^t e^{A(t-\tau)}\bar{b}(\tau)\,d\tau.$$

TEMA 4.-

ECUACIONES EN DERIVADAS PARCIALES

$z(x, y)$

$$\frac{\partial^2 z}{\partial x^2} - 3\frac{\partial^2 z}{\partial x \partial y} + 6\frac{\partial^2 z}{\partial y^2} = z(x, y).$$

$h(x, y, z)$

$$\frac{\partial h}{\partial z} - 6\frac{\partial^2 h}{\partial x \partial y} + 12\frac{\partial^3 h}{\partial x \partial y \partial z} = 0$$

Solución general puede no ser única.