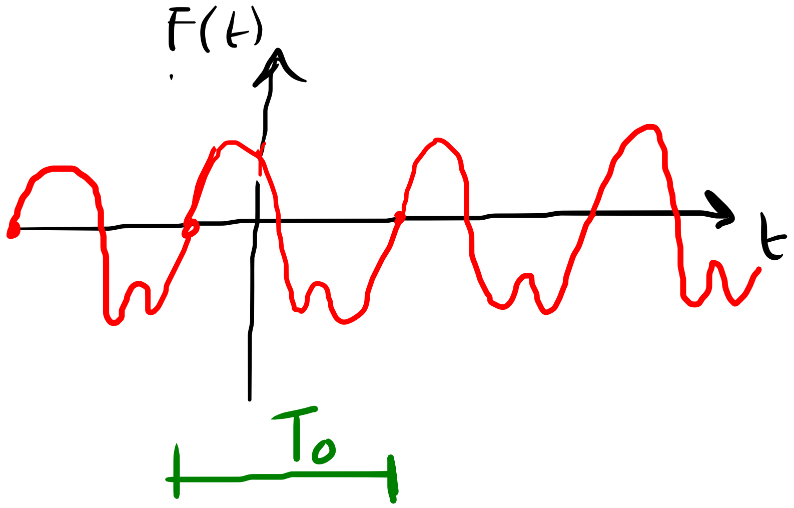
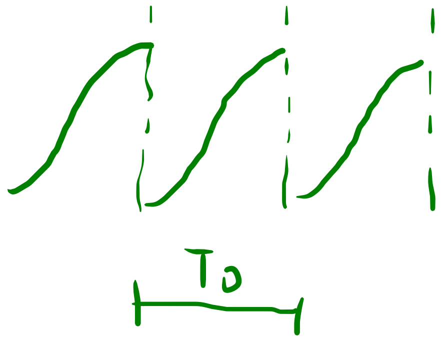
# FORZANTE PERIODICA GENERICA

10/11/21




$$F(t+kT_0) = F(t), \quad k \in \mathbb{Z}$$

$T_0$: periodo della forzante, $\omega_0 = \frac{2\pi}{T_0}$

$$F(t) = F_0 + \sum_{n=1}^{\infty} \left[ A_n \cos(n\omega_0 t) + B_n \sin(n\omega_0 t) \right]$$

SERIE DI FOURIER

$$F_0 = \frac{1}{T_0} \int_{\bar{t}}^{\bar{t}+T_0} F(t)\, dt$$

$$A_n = \frac{2}{T_0} \int_{\bar{t}}^{\bar{t}+T_0} F(t) \cos\left(\frac{2\pi n}{T_0} t\right) dt$$

$B_n = \quad \sin( \quad )$

Solitamente

$$F(t) \simeq F_0 + \sum_{n=1}^{N \to \text{n° limitato}} \left[ \qquad \right]$$

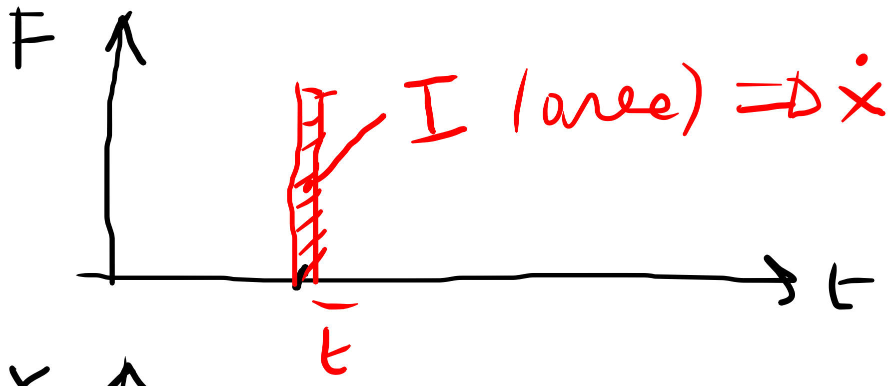
La risposta dell'oscillatore la ottengo sommando le risposte ottenute dai singoli termini.

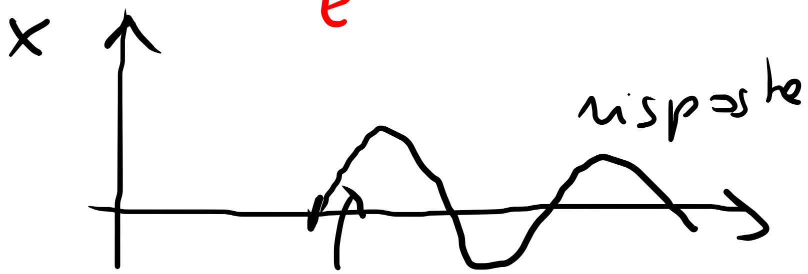
$\hookrightarrow x(t) = e^{-\nu\omega t}\left(C_1 \cos\omega_d t + C_2 \sin\omega_d t\right) + x^{part}(t)$

con $x^{part}(t) = \frac{F_0}{K} + \sum_{n=1}^{N} \left[ a_n \cos(n\omega_0 t) + b_n \sin(n\omega_0 t) \right]$

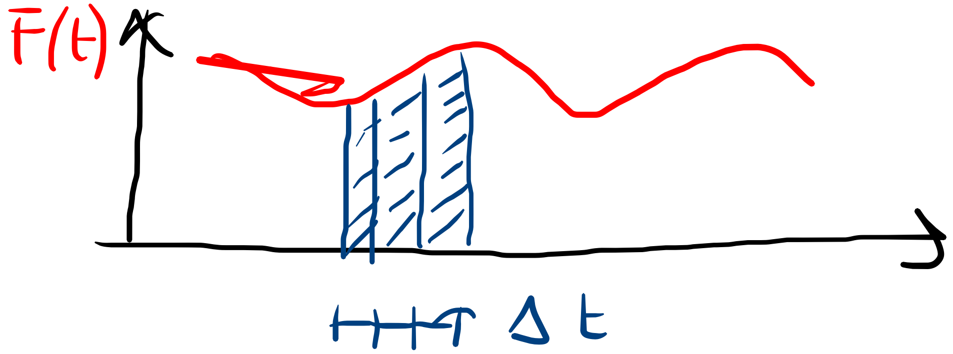
# INTEGRALE DI DUHAMEL

Fornisce la risposta dinamica di un oscillatore eccitato da una forzante generica ($F(t)$)




$\Downarrow$




$$F = \frac{dq}{dt}$$

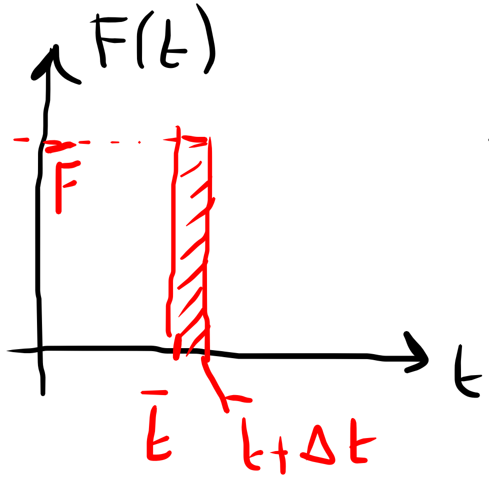
$$F\,dt = dq$$

$$dI = dq$$

$$I = \Delta q$$

quantità di moto

## Forze impulsive




impulso

$$I = \int F(t)\,dt$$

$$I = \bar{F}\,\Delta t$$

Il teorema dell'impulso:

$$m\dot{x}(\bar{t}^+) = I \rightarrow \dot{x}(\bar{t}^+) = \frac{I}{m}$$

La risposta totale sarà data dalla somma degli effetti dei singoli impulsi.