

13a Lezione 17 Dicembre 2015:

- Correzione in aula del compito
- Vedere Testo con soluzione e Risultati disponibili in rete

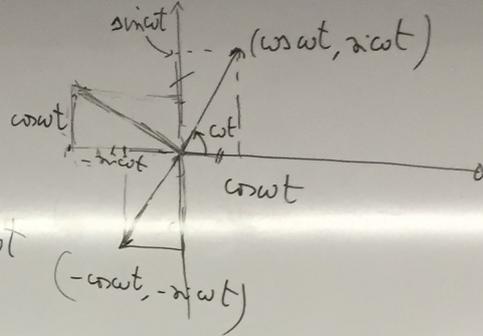
Compitino n.1 del 10 dic. 2015

$$\dot{\vec{F}} = \omega r_0 (-\hat{e}_x \sin \omega t + \hat{e}_y \cos \omega t)$$

$$\frac{d\vec{F}}{dt} = \dot{\vec{F}} = (-\omega r_0 \sin \omega t, \omega r_0 \cos \omega t)$$

$$\begin{aligned} \dot{F}^2 &= \dot{\vec{F}} \cdot \dot{\vec{F}} = \omega^2 r_0^2 \sin^2 \omega t + \omega^2 r_0^2 \cos^2 \omega t \\ &= \omega^2 r_0^2 (\sin^2 \omega t + \cos^2 \omega t) = \omega^2 r_0^2 \end{aligned}$$

$$v = \dot{F} = \omega r_0 = 2 \text{ ms}^{-1}$$

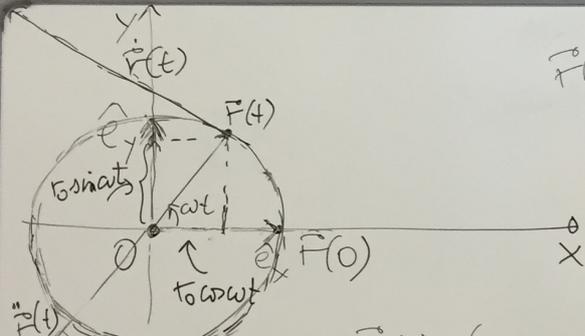


$$|\ddot{\vec{F}}| = \ddot{F} = \omega^2 r_0 = 4 \text{ ms}^{-2}$$

$$= \frac{v^2}{r} \quad v = \omega r_0$$

$$\begin{aligned} \dot{\vec{F}} \cdot \vec{F} &= \omega r_0^2 (-\sin \omega t \cos \omega t + \cos \omega t \sin \omega t) \\ &= 0 \end{aligned}$$

$$\begin{aligned} \ddot{\vec{F}} &= \omega^2 r_0 (-\hat{e}_x \cos \omega t - \hat{e}_y \sin \omega t) \\ &= \omega^2 r_0 (-\cos \omega t, -\sin \omega t) \end{aligned}$$



$$\vec{F}(t) \begin{cases} X(t) = r_0 \cos \omega t \\ Y(t) = r_0 \sin \omega t \end{cases} \quad X^2 + Y^2 = r_0^2$$

$$X^2 = r_0^2 \cos^2 \omega t$$

$$Y^2 = r_0^2 \sin^2 \omega t$$

$$X^2 + Y^2 = r_0^2 (\cos^2 \omega t + \sin^2 \omega t)$$

$$\begin{aligned} \hat{e}_x &= (1, 0) \\ \hat{e}_y &= (0, 1) \end{aligned}$$

$$\vec{F}(t) = (r_0 \cos \omega t, r_0 \sin \omega t)$$

$$\omega = 2 \text{ rad s}^{-1}$$

$$T = \frac{2\pi}{\omega}$$

tempo

$$|\hat{e}_x| = 1 = |\hat{e}_y|$$

$$\vec{F}(0), \vec{F}(t)$$

$$\vec{F} \perp |\dot{\vec{F}}|$$

$$\begin{cases} X(0) = r_0 \\ Y(0) = 0 \end{cases}$$

$$\textcircled{1} \vec{F}(t) = r_0 (\hat{e}_x \cos \omega t + \hat{e}_y \sin \omega t)$$

$$r_0 = 1 \text{ m}$$

$$\vec{F}(t) = \hat{e}_x r_0 \cos \omega t + \hat{e}_y r_0 \sin \omega t$$

$$\vec{F}(t) \neq r_0 (\cos \omega t + \sin \omega t)$$

$$(3) \vec{F}(t) = r_0 (\hat{e}_x \cos \omega t + \hat{e}_y \sin \omega t)$$

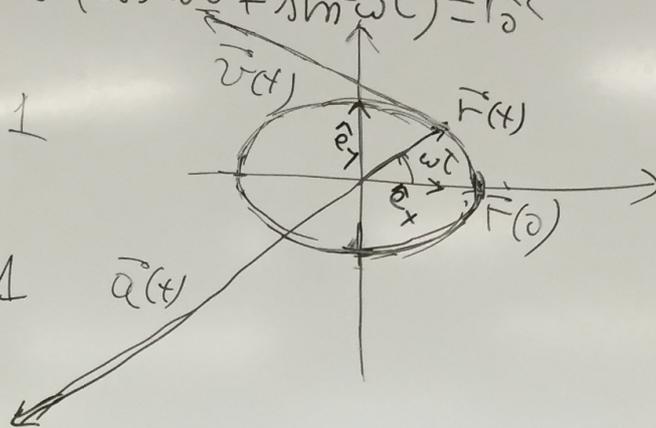
$$k=1.5 \quad = \left(r_0 k \cos \omega t, r_0 \sin \omega t \right)$$

$$\begin{cases} x^2 = r_0^2 k^2 \cos^2 \omega t \\ y^2 = r_0^2 \sin^2 \omega t \end{cases} \quad \begin{cases} \frac{x^2}{k^2} = r_0^2 \cos^2 \omega t \\ y = r_0 \sin^2 \omega t \end{cases}$$

$$\frac{x^2}{k^2} + y^2 = r_0^2 (\cos^2 \omega t + \sin^2 \omega t) = r_0^2$$

$$\frac{x^2}{k^2 r_0^2} + \frac{y^2}{r_0^2} = 1$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

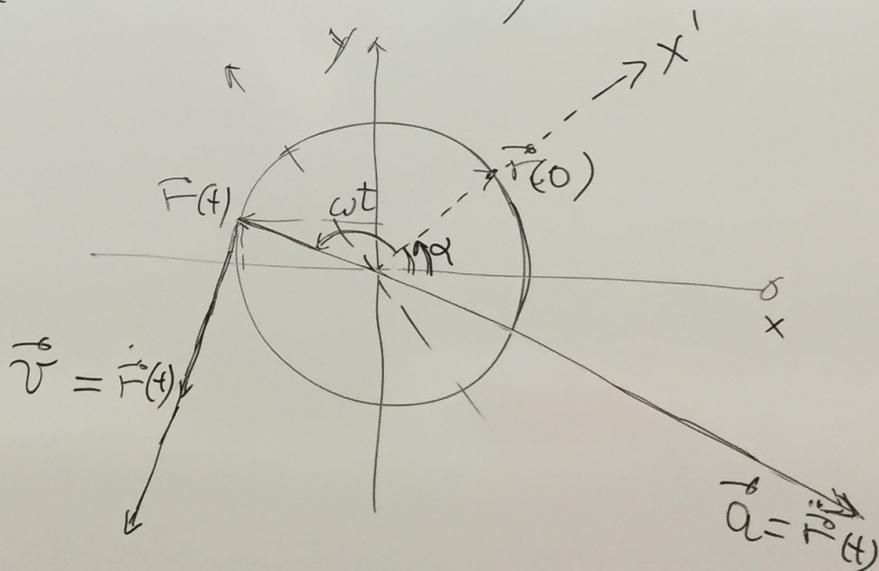


$$(2) \vec{F}(t) = r_0 (\hat{e}_x \cos(\omega t + \alpha) + \hat{e}_y \sin(\omega t + \alpha))$$

$$\alpha = \pi/4$$

$$\vec{F}(t) = r_0 (\cos(\omega t + \alpha), \sin(\omega t + \alpha))$$

$$T = \frac{2\pi}{\omega}$$



(4)

$$\dot{\vec{F}}(t) = \omega r_0 (-k \sin \omega t, \cos \omega t)$$

$$\dot{\vec{F}} \cdot \dot{\vec{F}} = \omega^2 r_0^2 (k^2 \sin^2 \omega t + \cos^2 \omega t)$$

$$v(t) = \omega r_0 \sqrt{k^2 \sin^2 \omega t + \cos^2 \omega t}$$

$$\ddot{\vec{F}}(t) = \omega^2 r_0 (-k \cos \omega t, -\sin \omega t)$$

$$a(t) = \omega^2 r_0 \sqrt{k^2 \cos^2 \omega t + \sin^2 \omega t}$$

$$(4) \vec{r}(t) = r_0 (\cos(\omega t + \alpha), \sin \omega t)$$

$$= r_0 (\hat{e}_x \cos(\omega t + \alpha) + \hat{e}_y \sin \omega t)$$

$$T = \frac{2\pi}{\omega}$$