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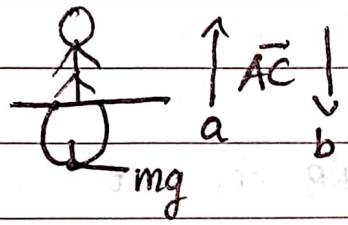
Kelompok 4

1. Putri Asnaul Karimah 2013022014
2. Winda Dwi Safitri 2013022018
3. Indah Sina Tyas 2013022042

5.1 a)



$\vec{N} + m\vec{g} - m\vec{A_0} = 0$

$N - mg - mA_0 = N - mg - m\frac{g}{4} = 0$

$N - \frac{5}{4}mg = 0$

$W' = N = \frac{5}{4}mg = \frac{5}{4}W$

$W' = 1501\text{N}$

b) $N - mg + m\left(\frac{g}{4}\right) = 0$

$W' = W - \frac{W}{4} = \frac{3}{4}W$

$W' = 901\text{N}$

5.2 a) $\vec{F}_{cent} = -m\vec{\omega} \times (\vec{\omega} \times \vec{r})$

Untuk $\vec{\omega} \perp \vec{r} \rightarrow F_{cent} = m\omega^2 r\hat{e}_r$

$\omega = 500\ s^{-1} = 1000\pi s^{-1}$

$F_{cent} = 10^{-6} \times (1000\pi)^2 \times r\hat{e}_r = 5\pi^2$

b) $\frac{F_{cent}}{F_g} = \frac{m\omega^2 r'}{mg}$

$= \frac{(1000\pi)^2 5}{980} = 5.04 \times 10^4$.

5.3 $\vec{mg} + \vec{T} - m\vec{a}_c = 0$

$-mg\hat{j} + T\cos\theta\hat{j} + T\sin\theta\hat{i} - m(g/10)\hat{i} = 0$

$T\cos\theta = mg$ dan $T\sin\theta = \frac{mg}{10}$

$T\theta = \frac{1}{10} \Rightarrow \theta = 5.71$

$T = \frac{mg}{\cos\theta} = 1.005\,mg$

5.4 $\vec{g} \cdot \vec{g} - \vec{A_0} = g\hat{i} - \frac{g}{16}\hat{i}$

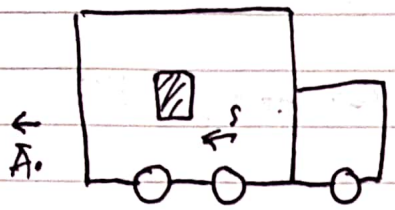
Untuk ayunan kecil Pada Pendulum sederhana :

$T = 2\pi\sqrt{\frac{l}{g}}$

$g' = \sqrt{g^2 - \left(\frac{g}{10}\right)^2} = 1.005g$,

$T = 2\pi\frac{1}{1.005g} = 1.995\pi\sqrt{\frac{1}{g}}$

5.5. Cari = $f = -Nmg$ pada frictional force acting on the box



$\vec{f} - m\vec{A}_0 = m\vec{a}$

sekarang, f adalah req force maka;

(b $a = \frac{f}{m} = -\frac{Nmg}{m} = -Ng = -\frac{g}{3}$.

$A = \frac{-g}{2}$. dari atas, $ma - mAc = m'$

maka jawaban (a) adalah

$a' = a - A_0 = -\frac{g}{3} + \frac{g}{2} = \frac{g}{6}$.

5.6. Jawaban:

a). $\vec{r} = \hat{i}(x_0 + R\cos\Omega t) + \hat{j} R \sin\Omega t$.

$\dot{\vec{r}} = -\hat{i}\Omega R \sin\Omega t + \hat{j}\Omega R \cos\Omega t$

$\dot{\vec{r}}\dot{\vec{r}} = V^2 = \Omega^2 R^2$

$V = \Omega R$.

b). $\vec{\dot{r}} = \dot{\vec{r}} - \vec{\omega} \times \vec{r}$ kehtka $\vec{r} = \hat{i}x' + \hat{j}y'$.

$= \hat{i}\Omega R \sin\Omega t + \hat{j}\Omega R \cos\Omega t - \omega k \times (\hat{i}x' + \hat{j}y')$.

$= \hat{i}\Omega R \sin\Omega t + \hat{j}\Omega R \cos\Omega t - \hat{j}\omega x' + \hat{i}\omega y'$

$\dot{x}' = \omega y' - \Omega R \sin\Omega t$

$\dot{y}' = -\omega x + \Omega R \cos\Omega t$.

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c). $u' = x' + iy' \quad = i = \sqrt{-1}$!

$\dot{u}' = \dot{x}' + i\dot{y}' = \omega y' - \Omega R \sin \Omega t - i\omega x' + i\Omega R \cos \Omega t$

$i\omega u' = \quad - \omega y' + i\omega x'$

$\rightsquigarrow \dot{u}' + i\omega u' = -\Omega R \sin \Omega t + i\Omega R \cos \Omega t = i\Omega R e^{i\Omega t}$

$u' = Ae^{-i\omega t} + Be^{i\Omega t}$

$\dot{u}' = -i\omega A e^{-i\omega t} + i\Omega B e^{i\Omega t}$

$i\omega u' = i\omega A e^{-i\omega t} + i\omega B e^{i\omega t}.$

$\rightsquigarrow \dot{u}' + i\omega u' = i(\omega + \Omega) B e^{i\omega t}$, maka $B = \frac{\Omega R}{\omega + \Omega}.$

$u' = A + B = x'(0) + iy(0) = x_0 + R.$

$\rightsquigarrow A = x_0 + R - B.$

$= x_0 + R = \frac{\Omega R}{\omega + \Omega}$ maka $A = x_0 + \frac{\omega R}{\omega + \Omega}.$

$u' = A + B = x'(0) + iy(0) = x_0 + R.$

$\rightsquigarrow A = x_0 + R - B.$

$= x_0 + R = \frac{\Omega R}{\omega + \Omega}$, maka $A = x_0 + \frac{\omega R}{\omega + \Omega}.$

$$u' = \left[x_0 + \frac{\omega R}{N + \Omega} \right] e^{-i\omega t} + \frac{\Omega R}{\omega + \Omega} e^{i\omega t}$$

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6.7.

a) $\overset{s}{r}_n(t) = \begin{matrix} Ra \cos \omega at \\ Ra \sin \omega at \end{matrix}$

$\overset{s}{r}_e(t) = \begin{matrix} Re \cos \omega et \\ Re \sin \omega et \end{matrix}$

$\frac{e}{a} = \frac{s}{a} \cdot \frac{s}{e}$

$\overset{e}{r}_a(t) = \begin{matrix} Ra \cos \omega at - Re \cos \omega et \\ Ra \sin \omega at - Re \sin \omega et \end{matrix}$

$r^e_a = r^s_a - r^s_e$

$\overset{e}{r}_a(t) = \begin{bmatrix} Ra \cos \omega at - Re \cos \omega et \\ Ra \sin \omega at - Re \cos \omega et \end{bmatrix}$

b) $V^e_a(t) = \frac{d}{dt} r_a^e(t)$

$\begin{bmatrix} -\omega a Ra \sin \omega at + \omega e Re \sin \omega et \\ \omega a Ra \cos \omega at - \omega e Re \cos \omega et \end{bmatrix}$

$t = 0$

$V^e_a(t) = 0 \begin{bmatrix} 0 \\ \omega a Ra - \omega e Re \end{bmatrix}$

c) $a^e_a(t) = \frac{d}{dt} V_a^e(t)$

$= \begin{bmatrix} -\omega a^2 Ra \cos \omega at + \omega e^2 Re \sin \omega et \\ -\omega a^2 Ra \sin \omega at + \omega e^2 Re \cos \omega et \end{bmatrix}$