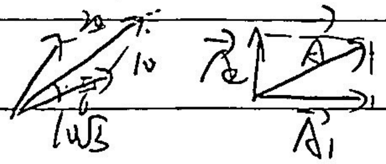
238. 6-14

(1) $A = A_2 - A_1$

(2) $X = (A_2 - A_1)\cos(\frac{2\pi}{T}t - \frac{\pi}{2})$

238. 6-15

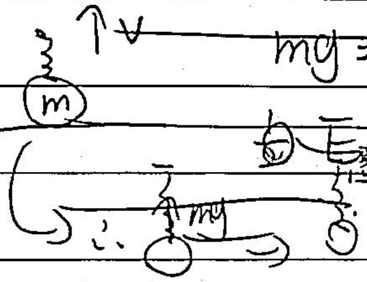


(1) $\cancel{A=\sqrt{A_1^2+A_2^2-2A_1A_2\cos(\varphi_2-\varphi_1)}}$

$A_2 = 10\,cm$. } ~~如右图示.~~

(2) $\Delta\varphi = \frac{\pi}{2}$

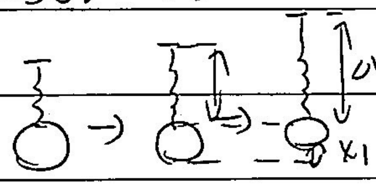
~~238. 6-16~~



~~$mg = kx \Rightarrow x = \frac{mg}{k}$, 此时以弹簧为参考系,~~

~~由 $E = \frac{1}{2}mv^2$ 由对称性 再左X伸最长.~~

238. 6-16



∴ $\Delta x = vt - x_1 + \frac{mg}{k}$

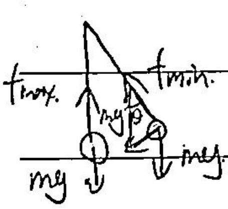
$kx - mg = m\frac{d^2x_1}{dt^2} \Rightarrow x_1'' + \frac{k}{m}x_1 = \frac{kv}{m}t$

∴ $x_1 = C_1\cos\omega t + C_2\sin\omega t + vt$. 由初值 $\begin{cases} x_1(0)=0 \\ x_1'(0)=0 \end{cases}$ 得.

$x_1 = -\frac{v}{\omega}\sin\omega t + vt$ 当 max 时 $\frac{dx_1}{dt} = v$.

∴ $t = \frac{\pi}{2\omega}$ ∴ $E = \frac{1}{2}kx^2 + \frac{1}{2}mv^2 + mgx_1 = \frac{\pi}{2}mgv\sqrt{\frac{m}{k}} + mv^2 + \frac{m^2g^2}{2k}$

239. 6-20



$$\begin{cases} f_{max} - mg = m\frac{v_m^2}{l} \\ f_{min} = mg\cos\theta_m \\ \frac{1}{2}mv_m^2 = mgl(1-\cos\theta_m) \end{cases} \Rightarrow \begin{cases} m = \frac{f_{max}+2f_{min}}{3g} \\ \cancel{\theta_m =} \\ \cancel{v_m =}\ \theta_m = \arccos\frac{3f_{min}}{f_{max}+2f_{min}} \end{cases}$$

6-24.

~~(由) $\frac{x^2}{A_1^2}+\frac{y^2}{A_2^2}-\frac{2xy}{A_1A_2}\cos(\varphi_2-\varphi_1)=\sin^2(\varphi_2-\varphi_1)$.~~

(1) ∵ $A_1=A_2=4$, $\varphi_1=\frac{\pi}{6}$, $\varphi_2=-\frac{\pi}{6}$ ∴ $x^2+y^2-xy=12$ 椭圆

(2) $A_1=4=A_2$, $\varphi_1=\frac{\pi}{6}$, $\varphi_2=-\frac{5}{6}\pi$ $(x+y)^2=0 \Rightarrow$ ~~x=y~~ $x=-y$. 直线.

(3) ∵ $A_1=A_2=4$. $\varphi_1=\frac{\pi}{6}$, $\varphi_2=\frac{2}{3}\pi$ ∴ $x^2+y^2=16$, 圆.

6-25.

$f_x:f_y=N_x:N_y$. $N_x=6$, $N_y=4$

∴ $f_y=\frac{N_y f_x}{N_x}=1.8\times10^4$ Hz.