W

Pendulum math

Small angle approx. $T_0 = 2\pi\sqrt{\frac{l}{g}}$

Arbitrary applitude period: $T = \frac{2T_0}{\pi} K(k)$

From code: $I = g \times M \cdot R \cdot \frac{T_{Arg}^2}{4\pi^2} \cdot \left(\frac{1}{\cancel{AG}(1, \cos\frac{\theta}{2})}\right)^2$ M_{AG}

Mistake in arranging formula $\rightarrow$ $- I_{coin}$

From documentation: for a simple pendulum $T = \frac{2\pi}{M_{AG}(1, \cos\frac{\theta}{2})}\sqrt{\frac{l}{g}}$

Working in moment of inertia:

$\Rightarrow \tau = I\alpha$
$= -mgl\sin\theta$

$\alpha = \ddot{\theta} = -\frac{mgL\sin\theta}{I}$

For when (Pendulum rod has mass)

$T = 4K\left(\sin^2\frac{\theta_0}{2}\right)\sqrt{\frac{I}{mgL}}$

Rearranging ~~code~~ formula from ~~the~~ code:

$T^2 = \frac{4\pi^2}{gMR} \cdot I \cdot \left(M_{AG}(1, \cos(\frac{\theta}{2}))\right)^2$

$T = 2\pi\sqrt{\frac{I}{gMR}} \cdot \left(M_{AG}(1, \cos(\frac{\theta}{2}))\right)^2$

$T_0 = 2\pi\sqrt{\frac{l}{g}} \Rightarrow T = \frac{2}{\pi}\left(2\pi\sqrt{\frac{l}{g}}\right)\left(\frac{\pi}{2M(1-k, 1+k)}\right)$

$= \frac{2\pi}{M_{AG}(\cancel{1-k, 1+k})}\sqrt{\frac{l}{g}}$

$1, \cos(\frac{\theta}{2})$

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Clearly: Approximate $T_0 = 2\pi\sqrt{\frac{l}{g}}$ Real $T = \frac{2T_0}{\pi} K(k)$ where K is "elliptical ~~integ~~ integral which can be represented as a arith.-geometric mean

$$K(k) = \frac{\pi}{2M(x(k), y(k))}$$

$$T = \left(\frac{2}{\pi}\right)(2\pi)\sqrt{\frac{l}{g}}\left(\frac{\pi}{2}\right)\frac{1}{M_{AG}(x,y)}$$

$$T = 2\pi\sqrt{\frac{l}{g}}\frac{1}{M_{AG}(x,y)}$$

Questions → 1) Does the input for x, y change for a compound vs ~~regular~~ simple pendulum

ie does the input to K actually become $\sin^2\frac{\theta}{2}$ instead of $\sin\frac{\theta}{2}$ and if so, does that change the $x = 1, y = \cos\frac{\theta}{2}$ result?

(I don't think it does)

2) Is the equation in the code rearranged wrong?

3) Beta function for damping

$F_D = \beta v$ $F_D = \gamma m v$

$$\gamma = \frac{\beta}{m}$$

$$I = \frac{g \cdot M \cdot R}{\frac{\pi^2}{T_{avg}^2} \times \left(\frac{1}{agm(1, \cos\frac{\theta}{2})} + \frac{1}{agm(1, \cos\frac{\theta}{2})}\right)^2 + \beta^2}$$

$- M_{coin} \cdot R_{coin}^2$

$- I_{coin}$

$'' \; M_{coin} R^2$??

for now just solve for total inertia

$$I = \frac{T_{avg} \cdot gMR}{\pi^2 \left(\frac{1}{M(1, \cos\frac{\theta_1}{2})} + \frac{1}{M(1, \cos\frac{\theta_2}{2})}\right)^2}$$

$$K = \frac{\pi}{2M(1, \cos\frac{\theta}{2})}$$

$$\sqrt{\frac{l}{g}} = \sqrt{\frac{I}{mgL}}$$

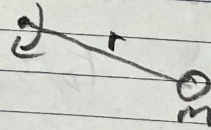
$$T = \frac{2}{\cancel{\pi}} \cdot \cancel{2\pi} \sqrt{\frac{l}{g}} \cdot \frac{\pi}{2M(1, \cos\frac{\theta}{2})} = 2\pi \sqrt{\frac{l}{g}} \frac{1}{M(1, \cos\theta)}$$

$$T = 2\pi \sqrt{\frac{I}{mgL}} \cdot \frac{1}{M(1, \cos\frac{\theta}{2})}$$

$$T^2 = 4\pi^2 \left(\frac{I}{mgL}\right)\left(\frac{1}{M(1, \cos\frac{\theta}{2})}\right)^2$$

$$\frac{I}{mgL} = \frac{\frac{T^2}{4\pi^2}}{\left(\frac{1}{M(1, \cos\frac{\theta}{2})}\right)^2} \qquad I = \frac{T^2 mgL}{4\pi^2 \left(\frac{1}{M(1, \cos\frac{\theta}{2})}\right)^2}$$

Point mass MOI



$I = mr^2$

Questions: 1) What is the two angle thing?

2) Mistake to subtract Icoin twice essentially?

3) what do M and R represent?

→ Just for coin, or also for setup / wheel, weighted distance