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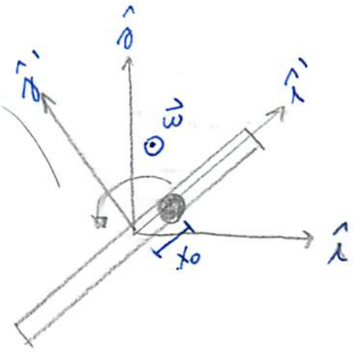

$$\vec{r} = x\hat{i} + y\hat{j} = x'\hat{i}' + y'\hat{j}'$$

$$y' = 0$$

$$\dot{\vec{r}} = \dot{x}'\hat{i}' + x'\dot{\hat{i}}' + \underset{0}{\underbrace{(y'\hat{j}')^{\cdot}}} = \dot{x}'\hat{i}' + x'(\vec{\omega}\times\hat{i}') = \dot{x}'\hat{i}' + x'\omega\hat{j}'$$

$$\vec{\omega} = \omega\hat{k} = \omega\hat{k}' \qquad \vec{\omega}\times\hat{i}' = \begin{vmatrix} \hat{i}' & \hat{j}' & \hat{k}' \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{vmatrix}\cdot\omega = \omega\hat{j}'$$

$$\dot{\vec{r}} = \dot{x}'^2 + x'^2\omega^2$$

$$T = \frac{1}{2}m(\dot{\vec{r}})^2 = \frac{1}{2}m\dot{x}'^2 + \frac{1}{2}m x'^2\omega^2 = L$$

$$V = 0$$

$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{x}'}\right) - \frac{\partial L}{\partial x} = m\ddot{x}' - \omega^2 x' m = 0$$

$$\Downarrow$$

$$\ddot{x}' - \omega^2 x' = 0$$

Nastavek:

$$x' = Ae^{\lambda t}$$

$$Ae^{\lambda t}(\lambda^2 - \omega^2) = 0$$

$$\lambda^2 = \omega^2$$

$$\lambda = \pm\omega$$

$$x' = Ae^{-\omega t} + Be^{\omega t}$$

Z.P.

$x'(0) = x_0$ $\qquad$ $x_0 = A + B$ $\qquad$ $A = B$

$\dot{x}'(0) = 0$ $\qquad$ $A = x_0 - B$

$2A = x_0$ $\qquad$ $B = \frac{x_0}{2}$

$A = \frac{x_0}{2}$

$$x'(t) = \frac{x_0}{2}\left(e^{\omega t} + e^{-\omega t}\right) = x\,\mathrm{ch}(\omega t) \qquad \dot{x}'(t) = x_0\omega\,\mathrm{sh}(\omega t)$$

$$x'(t_1) = \frac{l_0}{2}$$

$$\dot{x}'(t_1) = x_0\omega\,\mathrm{sh}(\omega t_1) = x_0\omega\sqrt{\mathrm{ch}(\omega t_1) - 1} = x_0\omega\sqrt{\frac{l_0^2}{4x_0^2} - 1}$$

$$\frac{l_0}{2} = x_0\,\mathrm{ch}(\omega t_1)$$

Z. P.

$x'(0) = \frac{l_0}{2}$

$\dot{x}'(0) = -\omega\sqrt{\frac{l_0^2}{4} - x_0^2}$

Nastavek:

$x' = Ae^{\lambda t}$

$\lambda = \pm\omega$

$\ddot{x}' - \omega^2 x' = 0$

$A + B = \frac{l_0}{2}$

$\underline{A = \frac{l_0}{2} - B}$

$-\omega\sqrt{\frac{l_0^2}{4} - x_0^2} = -\omega A + \omega B = -\omega\frac{l_0}{2} + 2\omega B$

$\underline{B = \frac{l}{4} - \frac{1}{2}\sqrt{\frac{l_0^2}{4} - x_0^2}}$

$A = \frac{l}{4} + \frac{1}{2}\sqrt{\frac{l_0^2}{4} - x_0^2}$

$x'(t) = \frac{l}{4}e^{-\omega t} + \frac{1}{2}\sqrt{\frac{l_0^2}{4} - x_0^2}\,e^{-\omega t} + \frac{l}{4}e^{\omega t} - \frac{1}{2}\sqrt{\frac{l_0^2}{4} - x_0^2}\,e^{\omega t}$

$\underline{x'(t) = \frac{l}{2}\,ch(\omega t) - \sqrt{\frac{l_0^2}{4} - x_0^2}\,sh(\omega t)}$