AKADEMIA EDUKACYJNO - INŻYNIERSKA

www.e-MECHANiK.com.pl

MATURA STUDIA PRAKTYKA STAŻ PRACA BIZNES PRZEMYSŁ STEAM

KOMPLEKSOWE WSPARCIE EDUKACYJNE **ON – LINE** NA KAŻDYM ETAPIE KSZTAŁCENIA INŻYNIERSKIEGO

email: **kontakt@e-mechanik.com.pl**
web: **www.e-MECHANiK.com.pl**
fb: www.facebook.com/groups/emechanik
tel: **(+48) - 697-165-075**

MECHANIKA II

"DYNAMIKA PUNKTU MATERIALNEGO – DRUCH HARMONICZNY"

PROJEKT

Oblicz:

- równania przemieszczeń
- równania prędkości
- okres i częstotliwość

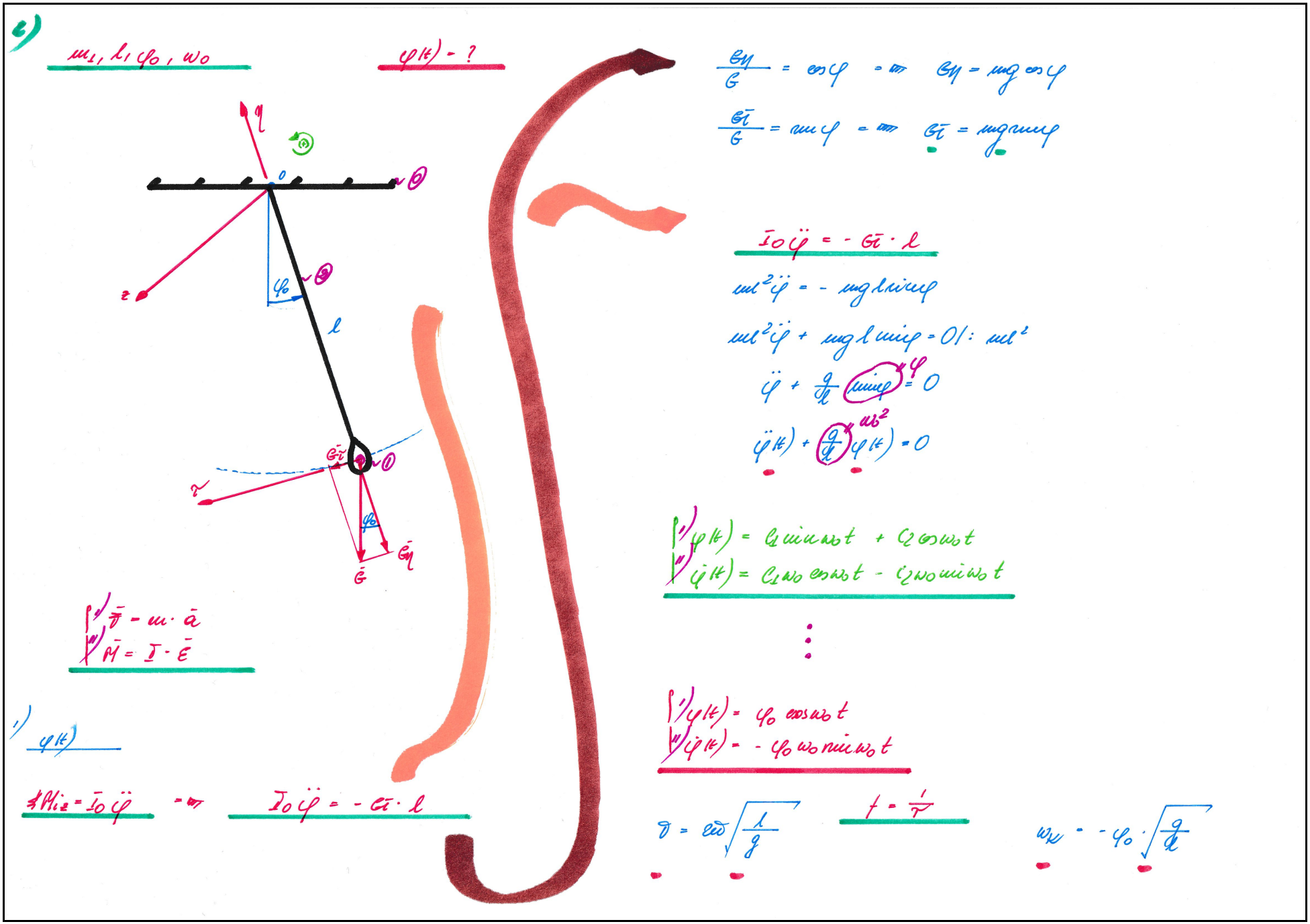
punktu materialnego w postaci ogólnych równań ruchu harmonicznego.

DANE:

1) m_1, φ_0, ω_{01} = *OK*
2) l_2 = *OK*

SZUKAM:

$\varphi(t)$, $\varphi'(t)$, T, f = ?



$\frac{G_n}{G} = \cos\varphi \Rightarrow G_n = mg\cos\varphi$

$\frac{G_\tau}{G} = \sin\varphi \Rightarrow G_\tau = mg\sin\varphi$

$I_O\ddot{\varphi} = -G_\tau \cdot l$

$ml^2\ddot{\varphi} = -mgl\sin\varphi$

$ml^2\ddot{\varphi} + mgl\sin\varphi = 0 \;/:ml^2$

$\ddot{\varphi} + \frac{g}{l}\sin\varphi = 0$

$\ddot{\varphi}(t) + \frac{g}{l}\varphi(t) = 0$, ω_0^2

$\begin{cases} \varphi(t) = C_1\sin\omega_0 t + C_2\cos\omega_0 t \\ \dot{\varphi}(t) = C_1\omega_0\cos\omega_0 t - C_2\omega_0\sin\omega_0 t \end{cases}$

$\vdots$

$\begin{cases} \varphi(t) = \varphi_0\cos\omega_0 t \\ \dot{\varphi}(t) = -\varphi_0\omega_0\sin\omega_0 t \end{cases}$

$\begin{cases} \bar{F} = m\cdot\bar{a} \\ \bar{M} = \bar{I}\cdot\bar{\varepsilon} \end{cases}$

1) $\varphi(t)$

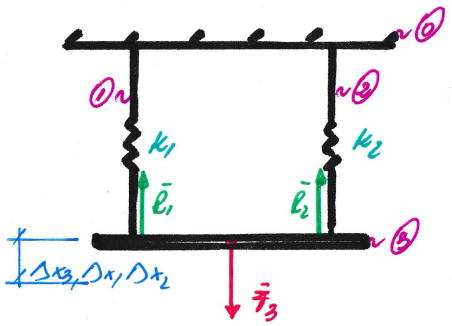
$\sum M_{iz} = I_O\ddot{\varphi} \Rightarrow I_O\ddot{\varphi} = -G_\tau \cdot l$

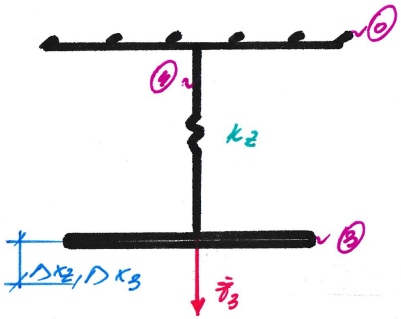
$T = 2\pi\sqrt{\frac{l}{g}}$ $\quad f = \frac{1}{T}$ $\quad \omega_0 = \varphi_0\sqrt{\frac{g}{l}}$

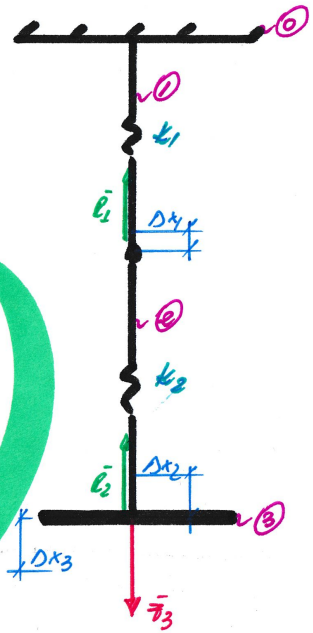
$\bar{F} = m \cdot \bar{a}$

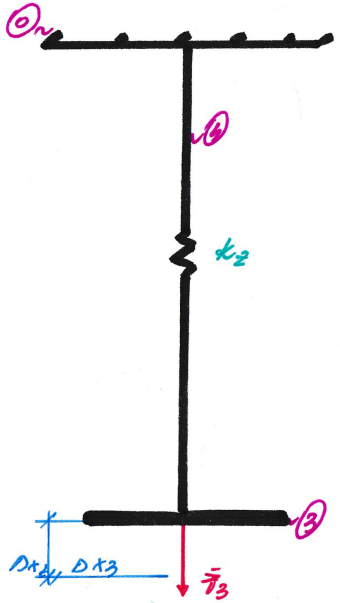
$U = \bar{I} \cdot e$

$\bar{F} = k \cdot \Delta x$









$$\begin{cases} \bar{F}_1 = k_1 \cdot \Delta x_1 \\ \bar{F}_2 = k_2 \cdot \Delta x_2 \\ \bar{F}_2 = k_2 \cdot \Delta x_2 \end{cases}$$

$$\begin{cases} \bar{F}_1 = k_1 \cdot \Delta x_2 \\ \bar{F}_2 = k_2 \cdot \Delta x_2 \\ \bar{F}_2 = k_2 \cdot \Delta x_2 \end{cases}$$

$\bar{F}_2 = \bar{F}_1 + \bar{F}_2$

$k_2 \Delta x_2 = k_1 \Delta x_1 + k_2 \Delta x_2$; $\Delta x_2 = \Delta x_1 = \Delta x_2$

$k_2 = k_1 + k_2$

$\Delta x_2 = \Delta x_1 + \Delta x_2$

$\frac{\bar{F}_2}{k_2} = \frac{\bar{F}_1}{k_1} + \frac{\bar{F}_2}{k_2}$; $\bar{F}_2 = \bar{F}_1 = \bar{F}_2$

$\frac{1}{k_2} = \frac{1}{k_1} + \frac{1}{k_2}$


e
-mechanik
.COM
.PL