

AKADEMIA EDUKACYJNO - INŻYNIERSKA

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MATURA STUDIA PRAKTYKA STAŻ PRACA BIZNES PRZEMYSŁ STEAM

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

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TEORIA MECHANIZMÓW I MANIPULATORÓW

"ANALIZA KINEMATYCZNA – RÓWNANIA KONTUROWE"

PROJEKT

Przeprowadź:

- analizę strukturalną
- analizę kinematyczną

dla układu mechanicznego w zadanym położeniu.

DANE:

κ_l, s_1, V_1, a_1 = *OK*

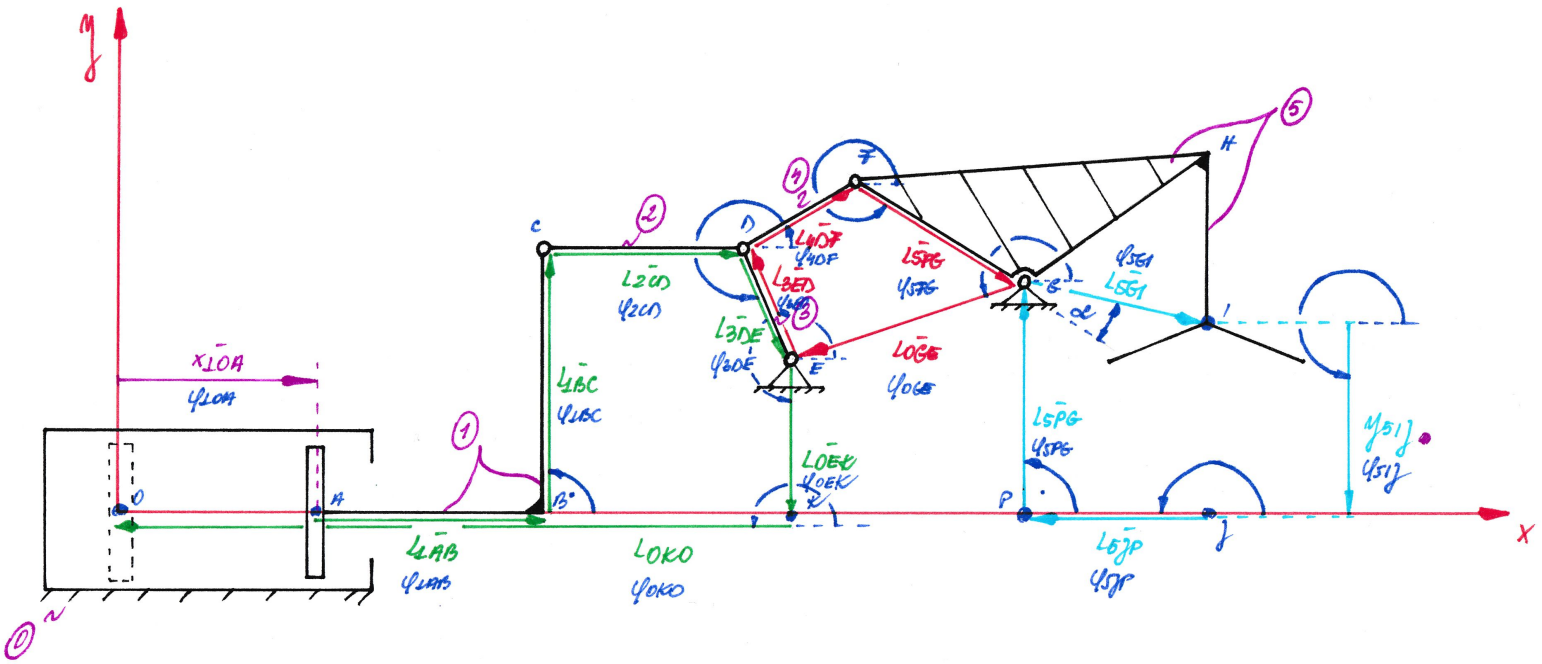
SZUKAM:

V, ω, a, ε = *?*

14

D: L_1, x_{10A} = ✓

Iz: $y_{51}(x_{10A}) = ?$



1) AN. KIN. - TRAJEKTORIJE.

- $x_{10A} + L_{1AB} + L_{1BC} + L_{2CD} + L_{3DE} + L_{0EK} + L_{0KO} = 0$
- $L_{3ED} + L_{4DF} + L_{5FG} + L_{0GE} = 0$
- $L_{GGI} + y_{51} + L_{5JP} + L_{5PG} = 0$

-1-

I) $x_{1OA}\cos\varphi_{1OA}\,(0^\circ) + l_{1AB}\cos\varphi_{1AB}\,(0^\circ) + l_{1BC}\cos\varphi_{1BC}\,(90^\circ) + l_{2CD}\cos\varphi_{2CD}\,(\sim?) + l_{3DE}\cos\varphi_{3DE}\,(\sim?) + l_{OEK}\cos\varphi_{OEK}\,(240^\circ) + l_{OKO}\cos\varphi_{OKO}\,(180^\circ) = 0$

II) $x_{1OA}\sin\varphi_{1OA}\,(0^\circ) + l_{1AB}\sin\varphi_{1AB}\,(0^\circ) + l_{1BC}\sin\varphi_{1BC}\,(90^\circ) + l_{2CD}\sin\varphi_{2CD} + l_{3DE}\sin\varphi_{3DE} + l_{OEK}\sin\varphi_{OEK}\,(240^\circ) + l_{OKO}\sin\varphi_{OKO}\,(180^\circ) = 0$

III) $l_{3ET}\cos\varphi_{3ET}\,(\sim?) + l_{4DF}\cos\varphi_{4DF}\,(\sim?) + l_{5FG}\cos\varphi_{5FG}\,(\sim?) + l_{OGE}\cos\varphi_{OGE}\,(\text{konst.}) = 0$

IV) $l_{3ET}\sin\varphi_{3ET} + l_{4DF}\sin\varphi_{4DF} + l_{5FG}\sin\varphi_{6FG} + l_{OGE}\sin\varphi_{OGE}\,(\text{konst.}) = 0$

V) $l_{5G1}\cos\varphi_{5G1}\,(\sim?) + y_{51}\cos\varphi_{51}\,(240^\circ)\,(\sim?) + l_{5JP}\cos\varphi_{5JP}\,(180^\circ)\,(\sim?) + l_{5PG}\cos\varphi_{5PG}\,(90^\circ) = 0$

VI) $l_{5G1}\sin\varphi_{5G1} + y_{51}\sin\varphi_{51}\,(240^\circ) + l_{5JP}\sin\varphi_{5JP}\,(180^\circ) + l_{5PG}\sin\varphi_{5PG}\,(90^\circ) = 0$

8?

VII) $\varphi_{3ET} = \varphi_{3DE} - 180^\circ$

VIII) $\varphi_{5G1} - \varphi_{5FG} + \alpha$

-2-

$$
\begin{cases}
\text{I)} & x_{10A}(1) + L_{1AB}(1) + L_{1BC}(0) + L_{2CD}\cos\varphi_{2CD} + L_{3DE}\cos\varphi_{3DE} + L_{0EK}(0) + L_{0KO}(-1) = 0 \\
\text{II)} & x_{10A}(0) + L_{1AB}(0) + L_{1BC}(1) + L_{2CD}\sin\varphi_{2CD} + L_{3DE}\sin\varphi_{3DE} + L_{0EK}(-1) + L_{0KO}(0) = 0
\end{cases}
$$

$$
\begin{cases}
\text{III)} & L_{3ED}\cos(\varphi_{3DE} - 180^\circ) + L_{4DF}\cos\varphi_{4DF} + L_{5FG}\cos\varphi_{5FG} + L_{0GE}\cos\varphi_{0GE} = 0 \\
\text{IV)} & L_{3ED}\sin(\varphi_{3DE} - 180^\circ) + L_{4DF}\sin\varphi_{4DF} + L_{5FG}\sin\varphi_{5FG} + L_{0GE}\sin\varphi_{0GE} = 0
\end{cases}
$$

(φ_{0GE}: const.)

$$
\begin{cases}
\text{V)} & L_{5G1}\cos(\varphi_{5FG} + \alpha) + y_{5j}(0) + L_{5JP}(-1) + L_{5PG}(0) = 0 \\
\text{VI)} & L_{5G1}\sin(\varphi_{5FG} + \alpha) + y_{5j}(-1) + L_{5JP}(0) + L_{5PG}(1) = 0
\end{cases}
$$

(6?)

$$
\begin{cases}
x_{10A} + l_{1AB} + l_{2CD}\cos\varphi_{2CD} + l_{3DE}\cos\varphi_{3DE} - l_{0KO} = 0 \\
l_{1BC} + l_{2CD}\sin\varphi_{2CD} + l_{3DE}\sin\varphi_{3DE} - l_{0EK} = 0
\end{cases}
$$

φ_{2CD} ~ ? φ_{3DE} ~ ?

$$
\begin{cases}
l_{3ED}\cos(\varphi_{3DE} - 180°) + l_{4DF}\cos\varphi_{4DF} + l_{5FG}\cos\varphi_{5FG} + l_{0GE}\cos\varphi_{0GE} = 0 \\
l_{3ED}\sin(\varphi_{3DE} - 180°) + l_{4DF}\sin\varphi_{4DF} + l_{5FG}\sin\varphi_{5FG} + l_{0GE}\sin\varphi_{0GE} = 0
\end{cases}
$$

φ_{4DF} ~ ? φ_{5FG} ~ ? l_{0GE} const. φ_{0GE} const.

$$
\begin{cases}
l_{5G}\cos(\varphi_{5FG} + \alpha) - l_{5P} = 0 \\
l_{5G}\sin(\varphi_{5FG} + \alpha) - y_{51} + l_{5PG} = 0
\end{cases}
$$

l_{5P} ~ ? y_{51} ~ ?

6?

$\Rightarrow$ $y_{51}(x_{10A}) = \checkmark$


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