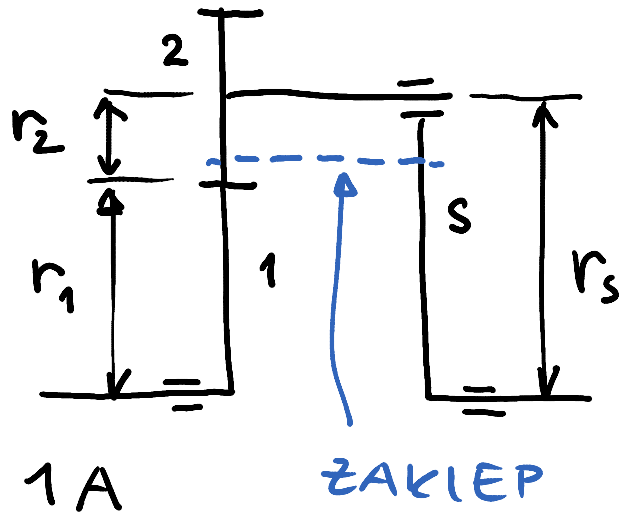


PLANETNA GONILA

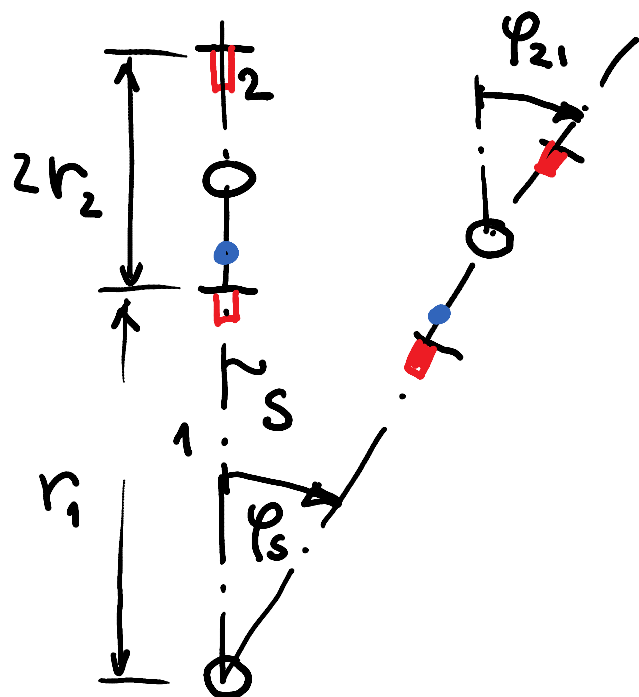
OSNOVNE ENAČBE PLANETNEGA GONILA



1 - SONČNIK

2 - PLANETNIK

S - NOSILEC PLANETNIČOV



$$\Phi_{21} = \Phi_s$$

\curvearrowright + POSITIVNO

\curvearrowleft - NEGATIVNO

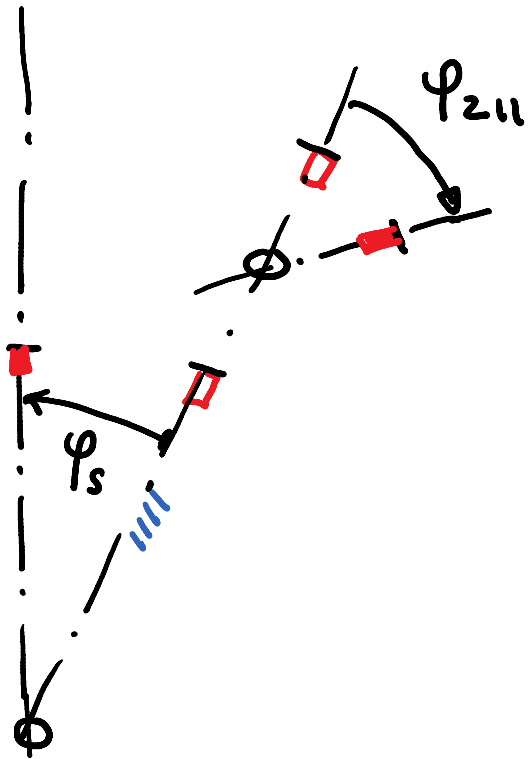
• ŽALIEP

V ŽALIJENEM

STANJU

\square ŽAČETNO STANJE

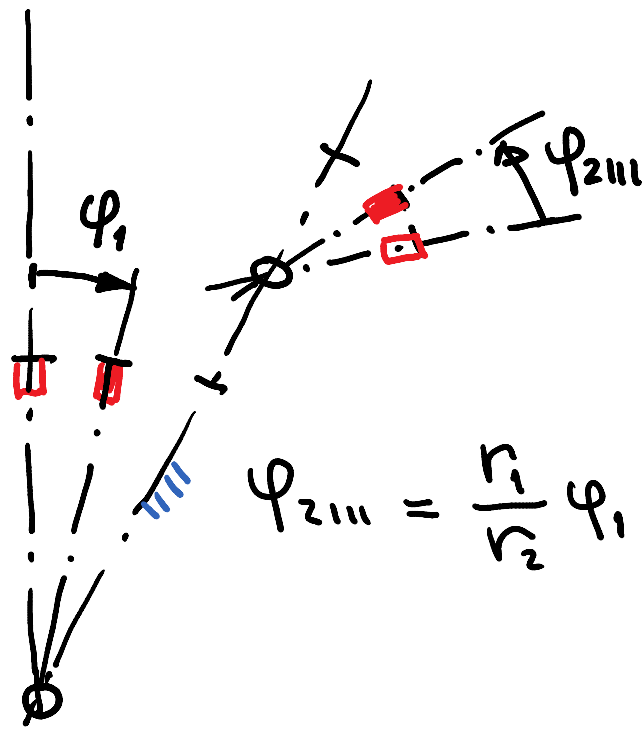
\blacksquare KONČNO STANJE



$$\varphi_s \cdot r_1 = \varphi_{211} r_2$$

$$\varphi_{211} = \frac{r_1}{r_2} \varphi_s$$

IIII FIZIRAMO
 NOSILEC PLANETNIČOU
 ŽALIEP V ODPLENĀENEM
 STANĀU



III FIKSIRANO NOSILEC
 PLANETNIČOU
 ZAČLEP U ODŠKENTJEVEM
 STANJU

$$\varphi_1 r_1 = \varphi_{2III} \cdot r_2$$

$$\begin{aligned} \varphi_2 &= \varphi_{2I} + \varphi_{2II} - \varphi_{2III} \\ &= \varphi_s + \frac{r_1}{r_2} \varphi_s - \frac{r_1}{r_2} \varphi_1 \end{aligned}$$

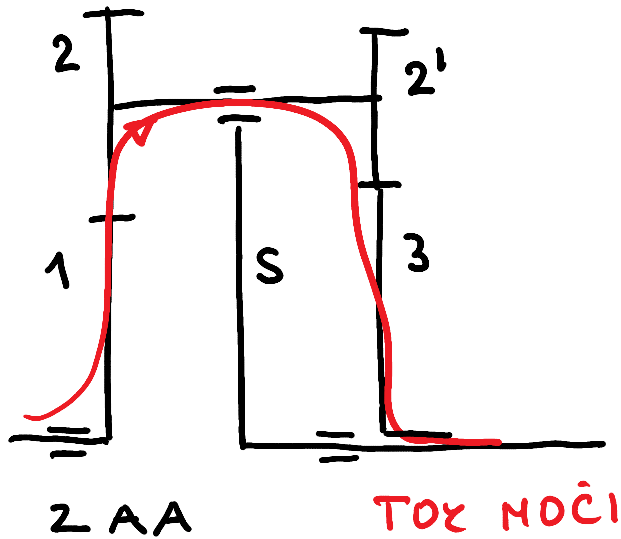
$$\varphi_2 + \frac{r_1}{r_2} \varphi_1 = \varphi_s \left(1 + \frac{r_1}{r_2}\right) \quad | \cdot \frac{r_2}{r_1}$$

$$\varphi_1 - i_{112} \varphi_2 = \varphi_s (1 - i_{112}) \quad | \frac{d}{dt}$$

$$\omega_1 - i_{112} \omega_2 = \omega_s (1 - i_{112}) \quad \blacksquare$$

$$i_{112} = - \frac{r_2}{r_1}$$

PRESTAUNO RAŽMERJE
 STABILNEGA GONILA



1 → 2

2 → 3

$$i_{2|3} = -\frac{r_3}{r_{21}} ; i_{2|1} = \frac{1}{i_{1|2}} ; i_{1|3} = i_{1|2} \cdot i_{2|3}$$

$$\omega_1 - i_{1|2} \omega_2 = \omega_s (1 - i_{1|2}) \quad | \cdot i_{2|1}$$

$$\omega_2 - i_{2|3} \omega_3 = \omega_s (1 - i_{2|3})$$

$$-\omega_2 + i_{2|1} \omega_1 = \omega_s (i_{2|1} - 1)$$

$$i_{2|1} \cdot \omega_1 - i_{2|3} \omega_3 = \omega_s (\cancel{1} - i_{2|3} + i_{2|1} - \cancel{1})$$

$$i_{2|1} \omega_1 - i_{2|3} \omega_3 = \omega_s (i_{2|1} - i_{2|3}) \quad | \cdot i_{1|2}$$

$$\omega_1 - i_{1|2} i_{2|3} \omega_3 = \omega_s (1 - i_{1|2} \cdot i_{2|3})$$

$$\omega_1 - i_{1|3} \omega_3 = \omega_s (1 - i_{1|3})$$

$$\omega_s = \emptyset$$

$$\omega_1 = \dot{\gamma}_{112} \omega_2 \rightarrow \frac{\omega_1}{\omega_2} = \dot{\gamma}_{112}$$

$$\omega_2 = \dot{\gamma}_{213} \omega_3 \rightarrow \frac{\omega_2}{\omega_3} = \dot{\gamma}_{213}$$

$$\omega_1 = \dot{\gamma}_{113} \omega_3 \rightarrow \frac{\omega_1}{\omega_3} = \dot{\gamma}_{113}$$

$$\omega_1 = \emptyset$$

$$-\dot{\gamma}_{112} \omega_2 = \omega_s (1 - \dot{\gamma}_{112})$$

$$\frac{\omega_2}{\omega_s} = -\frac{1 - \dot{\gamma}_{112}}{\dot{\gamma}_{112}}$$

$$-\dot{\gamma}_{113} \omega_3 = \omega_s (1 - \dot{\gamma}_{113})$$

$$\frac{\omega_3}{\omega_s} = -\frac{1 - \dot{\gamma}_{113}}{\dot{\gamma}_{113}}$$

$$\omega_3 = \emptyset$$

$$\omega_2 = \omega_s (1 - \dot{\gamma}_{213})$$

$$\frac{\omega_2}{\omega_s} = 1 - \dot{\gamma}_{213}$$

$$\omega_1 = \omega_s (1 - \dot{\gamma}_{113})$$

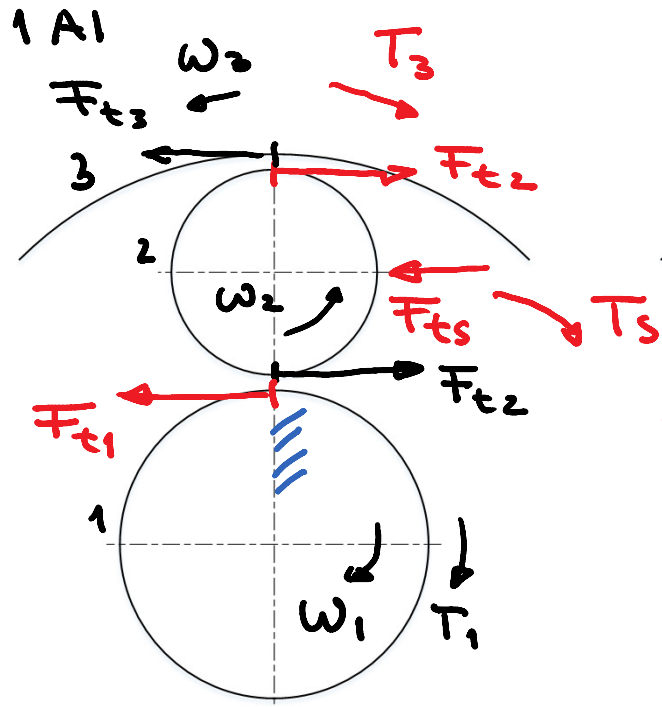
$$\frac{\omega_1}{\omega_s} = 1 - \dot{\gamma}_{113}$$

$$\omega_1 - \hat{\gamma}_{1|2} \omega_2 = \omega_s (1 - \hat{\gamma}_{1|2})$$

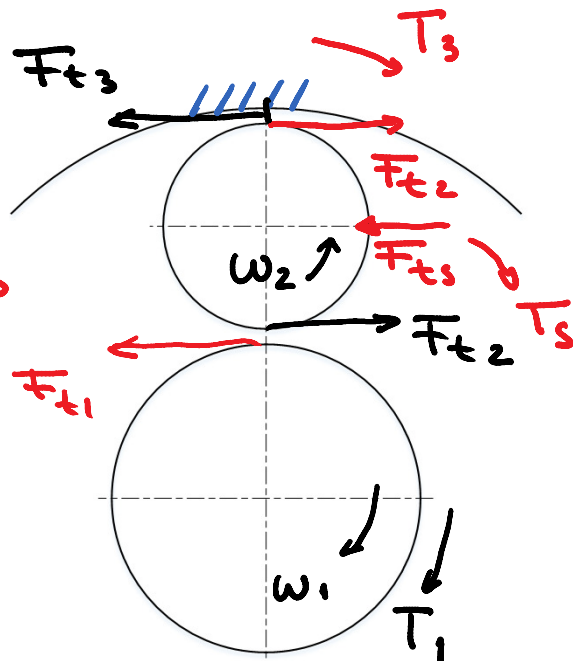
$$\omega_1 - \omega_s = \hat{\gamma}_{1|2} (\omega_2 - \omega_s)$$

$$\frac{\omega_1 - \omega_s}{\omega_2 - \omega_s} = \hat{\gamma}_{1|2} \quad \blacksquare$$

SILE MOMENTI IN MOČI BREZ UPOŠTEVANJA IZGUB



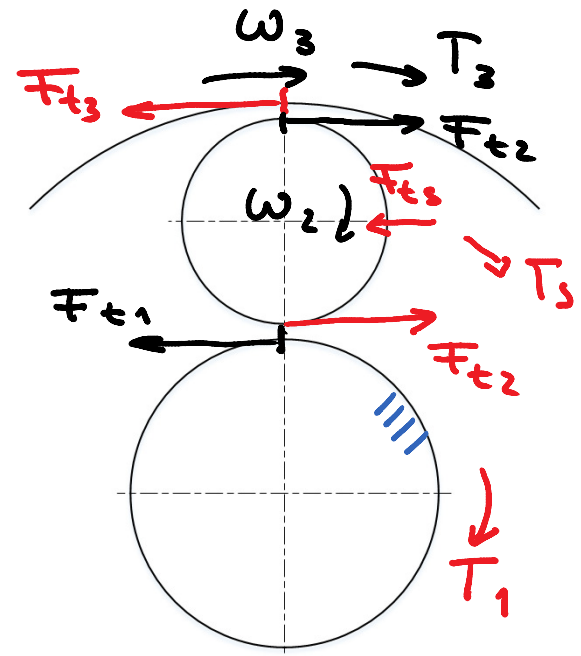
- 1 GONILNI
- 3 GNANI
- AKCIJA
- REAKCIJA



1 GONILNI
3 GNANI

$$- F_{t2} r_2 = T_2$$

MOMENT SILE F_{t2} NADOMESTIMO
S T_2



3 GONILNI
1 GNANI

$$\vec{F}_{t1} = \vec{F}_{t2} = \vec{F}_{t3}$$

$$\dot{\gamma}_{113} = -\frac{r_3}{r_1}$$

$$\vec{F}_{ts} = 2\vec{F}_{t2} = 2\vec{F}_{t1}$$

$$T_1 = \vec{F}_{t1} \cdot r_1$$

$$T_3 = \vec{F}_{t3} \cdot r_3 = \vec{F}_{t1} \cdot r_1 \cdot \frac{r_3}{r_1} = T_1 \frac{r_3}{r_1} = -\dot{\gamma}_{113} T_1$$

$$\frac{T_2}{T_1} = -\dot{\gamma}_{113}$$

$$T_s = -\vec{F}_{ts} r_s$$

$$T_1 + T_3 + T_s = 0$$

$$T_s = -T_1 - T_3 = -\vec{F}_{t1} \cdot r_1 - \vec{F}_{t1} \cdot r_1 \frac{r_3}{r_1} = -\vec{F}_{t1} \cdot r_1 \left(1 + \frac{r_3}{r_1}\right)$$

$$T_s = -T_1 (1 - \dot{\gamma}_{112}) \rightarrow \frac{T_s}{T_1} = - (1 - \dot{\gamma}_{113}) = \dot{\gamma}_{113} - 1$$

$$\frac{T_s}{T_1} = i_{113} - 1 \quad ; \quad \frac{T_3}{T_1} = -i_{113}$$

$$T_1 i_{113} = -T_3$$

$$T_1 = -\frac{T_3}{i_{113}}$$

$$\frac{T_s}{T_3} = -\frac{i_{113} - 1}{i_{113}}$$

$$P_1 = T_1 \cdot \omega_1$$

$$P_3 = T_3 \cdot \omega_3$$

$$P_s = T_s \cdot \omega_s$$

$$\frac{P_3}{P_1} = \frac{T_3 \omega_3}{T_1 \omega_1} = -i_{113} \frac{\omega_3}{\omega_1}$$

$$P_1 + P_3 + P_s = 0$$

$$T_1 \cdot \omega_1 + T_3 \omega_3 + T_s \cdot \omega_s = 0$$

$$\frac{P_s}{P_1} = \frac{T_s \cdot \omega_s}{T_1 \cdot \omega_1} = (\dot{\gamma}_{1|3} - 1) \frac{\omega_s}{\omega_1}$$

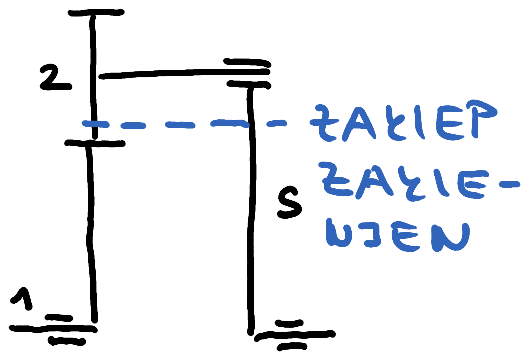
$$\frac{P_s}{P_3} = \frac{T_s \omega_s}{T_3 \omega_3} = - \frac{(\dot{\gamma}_{1|3} - 1)}{\dot{\gamma}_{1|3}} \frac{\omega_s}{\omega_3}$$

SILE MOMENTI IN MOČI + UPOŠTEVANTEM IZGUB

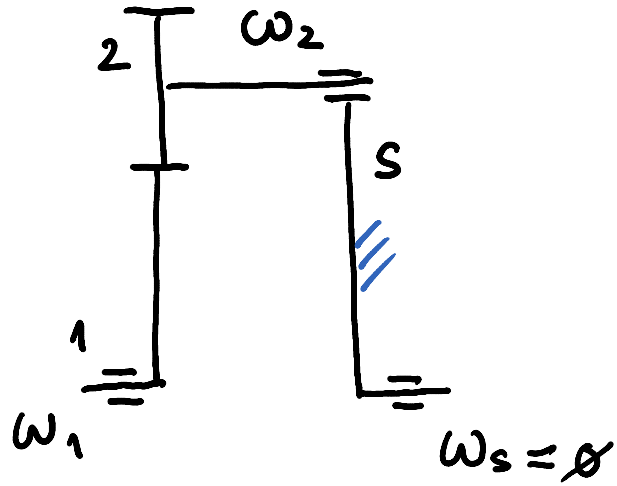
SZLOPNA MOČ - ZAPORA JE UELJUČENA, ZOBNIKI NE NAZOTALJUJEJO, MOČ SE PRENAŠA ČOT PRI SZLOPEI, PRESTAVA TEI IZGUBE NASTAJAJO LEU LEFAJIH, TESNILIH IN ZARADI MEŠANJA OLJA.

ČOTALNA MOČ - NOSILEC PLANETNIČOU MIRUJE, ČOUORIMO O STABILNEM ČONILU, MOČ SE PRENAŠA Z NAČOTALJEVANDEM

IZGUBE SO ENAČE ČOT PRI STABILNEM ČONILU, IZGUBE U LEFAJIH, TESNILIH, ZARADI MEŠANJA OLJA; IN ZARADI NA ČOTALJEVANJA



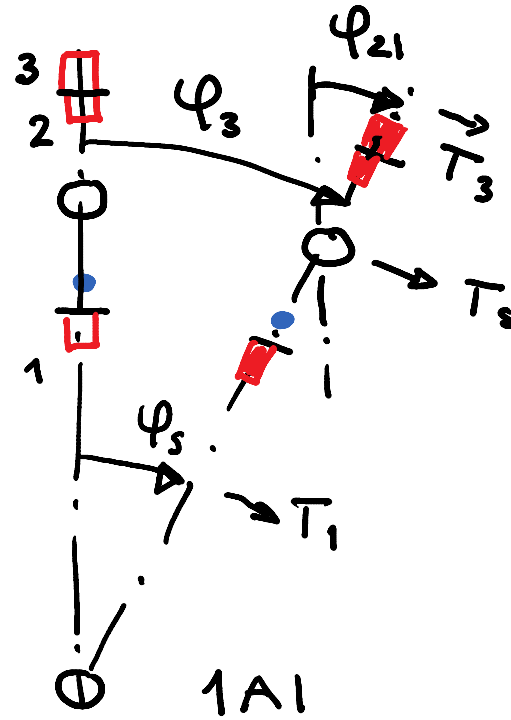
$$\omega_1 = \omega_s$$



$$W_{k1} = F_{t1} \cdot r_1 \cdot \varphi_s = T_1 \varphi_s$$

$$W_{k3} = F_{t3} r_3 \varphi_s = F_{t1} \cdot r_1 \frac{r_3}{r_1} \varphi_s$$

$$W_s = -F_{ts} r_s \varphi_s$$



• ZÄHLEP ZÄHLEN

$$\varphi_{21} = \varphi_s$$

$$\varphi_3 = \varphi_s$$

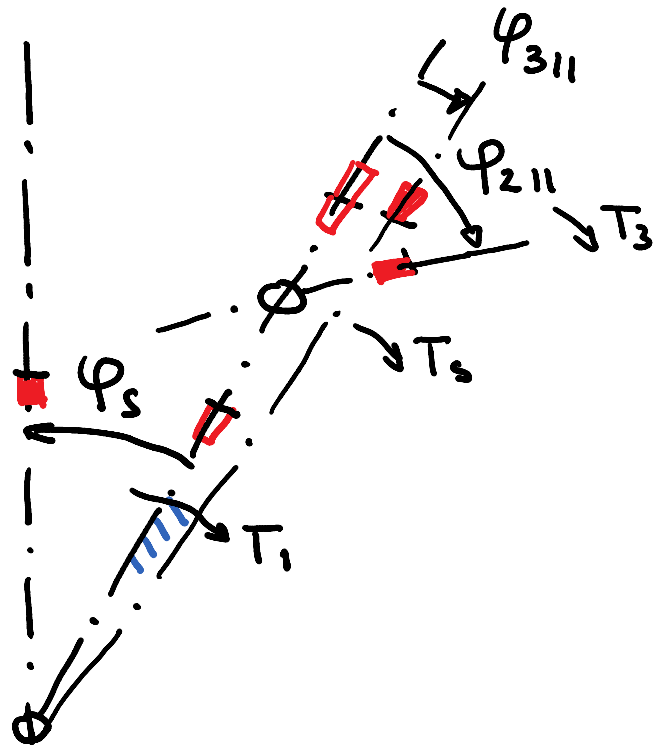
$$P_{k1} = \frac{dW_{k1}}{dt} = F_{t1} \cdot r_1 \cdot \omega_s$$

$$P_{k3} = \frac{dW_{k3}}{dt} = F_{t1} r_1 \frac{r_3}{r_1} \omega_s$$

$$P_s = - F_{ts} \cdot r_s \cdot \omega_s$$

$$r_s = r_1 + r_2$$

SKLOPNA MOĆ

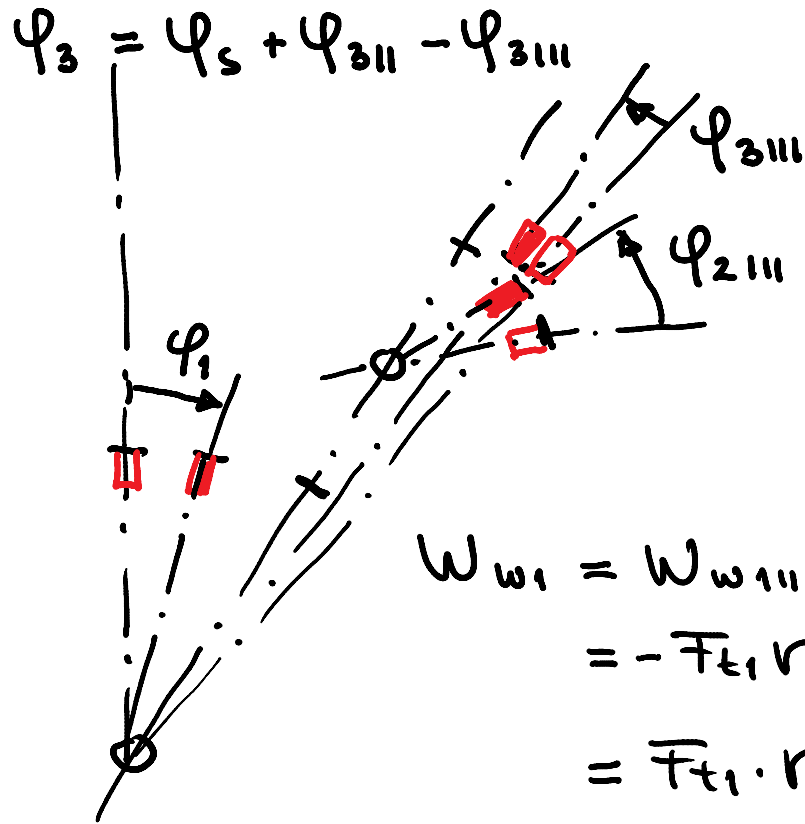


$$r_1 \cdot \varphi_s = r_2 \varphi_{211} = r_3 \varphi_{311}$$

$$W_{w11} = -F_{t1} \cdot r_1 \cdot \varphi_s$$

$$W_{w311} = F_{t3} r_3 \varphi_{311}$$

$$= F_{t1} r_1 \cdot \frac{r_3}{r_1} \varphi_{311}$$



$$r_1 \cdot \varphi_1 = r_2 \varphi_{211} = r_3 \varphi_{311}$$

$$W_{w111} = F_{t1} \cdot r_1 \cdot \varphi_1$$

$$\begin{aligned} W_{w311} &= -F_{t3} r_3 \varphi_{311} \\ &= -F_{t1} \cdot r_1 \frac{r_3}{r_1} \varphi_{311} \end{aligned}$$

$$\begin{aligned} W_{w1} &= W_{w11} + W_{w111} \\ &= -F_{t1} r_1 \varphi_s + F_{t1} \cdot r_1 \varphi_1 \\ &= F_{t1} \cdot r_1 (\varphi_1 - \varphi_s) \quad \blacksquare \end{aligned}$$

$$\begin{aligned} W_{w3} &= W_{w311} + W_{w3111} \\ &= F_{t3} r_3 \varphi_{311} - F_{t3} r_3 \varphi_{3111} \\ &= F_{t3} r_3 (\varphi_{311} - \varphi_{3111}) = F_{t3} r_3 (\varphi_3 - \varphi_s) \quad \blacksquare \end{aligned}$$

DOKAZ, DA JE $W_{w3} = -W_{w1}$

$$W_{w3} = F_{t3} r_3 (\varphi_3 - \varphi_s) = F_{t1} \cdot r_1 \frac{r_3}{r_1} (\varphi_{3II} - \varphi_{3III})$$

$$\frac{r_1}{r_3} \varphi_1 = \varphi_{3III} = F_{t1} \cdot r_1 \frac{r_3}{r_1} \left(\frac{r_1}{r_3} \varphi_s - \frac{r_1}{r_3} \varphi_1 \right)$$

$$\frac{r_1}{r_3} \varphi_s = \varphi_{3II} = F_{t1} r_1 (\varphi_s - \varphi_1) = -W_{w1}$$

$$P_{w3} = \frac{dW_{w3}}{dt} = F_{t3} r_3 (\omega_3 - \omega_s) \quad \blacksquare$$

$$P_{w1} = \frac{dW_{w1}}{dt} = F_{t1} \cdot r_1 (\omega_1 - \omega_s) \quad \blacksquare$$

$$P_1 = P_{t1} + P_{w1} \quad P_s$$

$$P_3 = P_{t3} + P_{w3}$$

$$P_1 + P_2 + P_3 = 0$$

$$P_{z1} + \cancel{P_{w1}} + P_{z3} + \cancel{P_{w3}} + P_s = 0$$

$$F_{t1} \cdot r_1 \cancel{w_s} + F_{t3} r_3 \cancel{w_s} - F_{ts} r_s \cancel{w_s} = 0$$

$$\cancel{F_{t1}} r_1 + \cancel{F_{t3}} r_3 - 2\cancel{F_{t1}} (r_1 + r_2) = 0$$

$$\cancel{r_1} + \cancel{r_1} + \frac{2r_2}{r_3} - 2\cancel{r_1} - 2\cancel{r_2} = 0$$

$$P_{iz} = (|P_{w1}| + |P_{w3}|) (1 - \eta) \quad \eta \text{ iteoristek}$$
$$= 2 |P_{w1}| \cdot (1 - \eta) \quad \text{RONILA}$$

$$\eta = \frac{P_{od}}{P_{do}} = \frac{P_{do} - P_{iz}}{P_{do}}$$