

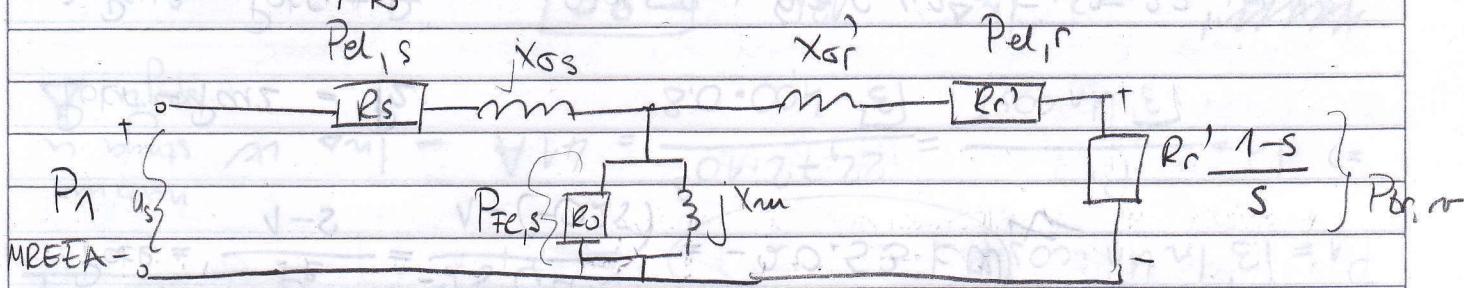
EEP

MASOVNE: PRIPREMA ZA ZAVRŠNICA

D Sedlić

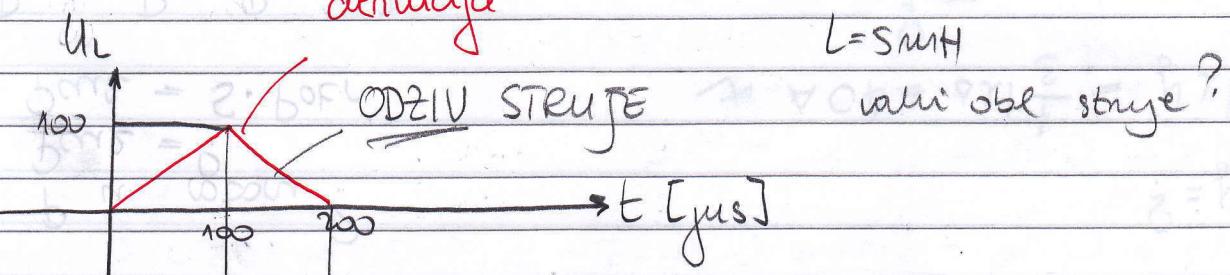
26. /01. /2013.

$R_s \frac{1-s}{s}$ - ekivalent anel. mada



P_2 - moh. snaga na osnovi

derivacija



$$L = S M H$$

veličine oba stрујa?

$$U_L(t) = L \frac{di(t)}{dt}$$

$$\Rightarrow i(t) = \frac{1}{L} \int_0^t U_L(t) dt = \frac{U_L}{L} t \Big|_0^t = \frac{100}{5 \cdot 10^{-3}} = 20 \cdot 10^3 t$$

$$i(t) = \begin{cases} 20 \cdot 10^3 t & 0 \leq t \leq 100 \\ -20 \cdot 10^3 t & 100 \leq t \leq 200 \end{cases}$$

3 TIPA PRETVARACIJA

D - faktor vodjenja

- SILAZNI
- UZLAZNI
- SILAZNI I UZLAZNI

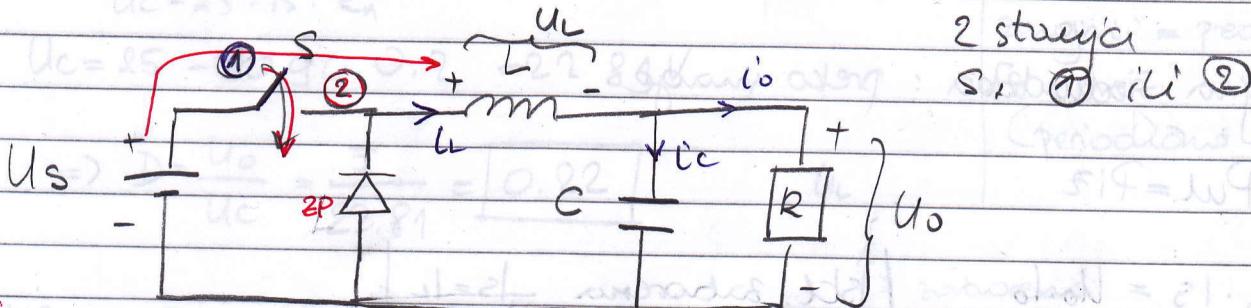
T - period

$U_1 T$

skl. je i zatočen i
zatočen!

PREDPOSTAVKE:

- * kruž je u stacionarnu stanju
- * struja na induktivitetu je konst (uvjet usta. odl 0)
- * C toliko velik da je $U = \text{const}$ (veliki napon)
- * komponente su idejne



S₂ - slopek zatočen

$$U_L = U_s - U_o = L \frac{di_L}{dt} \quad i_s = i_L$$

$$(U_s - U_o) D T = -U_o (1 - D) T$$

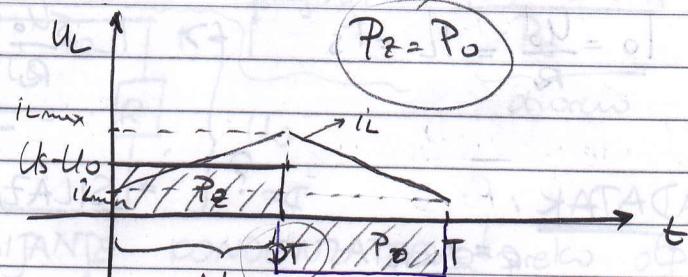
napon na induktivitetu

$$\Rightarrow \frac{di_L}{dt} = \frac{U_s - U_o}{L}$$

$$P_2 = P_0$$

$$\frac{\Delta i_{L2}}{\Delta t} = \frac{U_s - U_o}{L}$$

$$\Delta i_{L2} = \frac{U_s - U_o}{L} D \cdot T$$



$$\text{skl. zatočen} \quad \Delta t = T - \Delta T \\ = T(1 - D)$$

skl. zatočen

Min i max struja na inel.

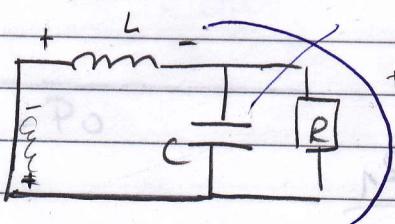
$$i_{L\max} = i_L + \frac{\Delta i_L}{2}$$

$$i_{L\min} = i_L - \frac{\Delta i_L}{2}$$

$$\Delta i_{L2} + \Delta i_{L0} = 0$$

$$\Delta i_{L2} = \Delta i_{L0}$$

Slopek otvoren $C \rightarrow \infty$



$$\Rightarrow U_L = -U_o = L \frac{di_L}{dt}$$

$$\frac{di_L}{dt} = -\frac{U_o}{L}$$

$$\frac{\Delta i_{L0}}{\Delta t} = -\frac{U_o}{L}$$

$$\Delta i_{L0} = -\frac{U_o (1 - D)}{L} T$$

$I_L = ?$

oursine ispod napona:

$$D \leq 1$$

faktor uvođenja

stl. ne može biti zatvorena
duže od jednog perioda

$$(U_s - U_o) D \cdot T = + U_o (1 - D) \cdot T$$

$$U_{iz} < U_{ul}$$

$$U_s \cdot D - U_o D = U_o - U_o \cdot D$$

$$\Rightarrow U_o = U_s \cdot D \quad \text{naponska jedinjenja preko površina}$$

$$\Delta i_{Lz} + \Delta i_{L0} = 0 \rightarrow \text{struja mora biti periodična}$$

strujna jedinjenja: preko image

$$P_{ul} = P_{iz}$$

$$U_s \cdot I_s = U_o \cdot I_o \quad | \text{stl. zatvorena } I_s = I_L$$

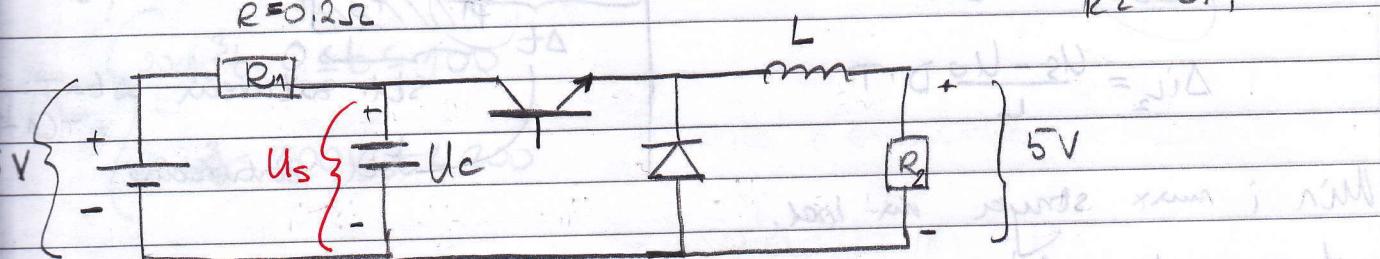
$$\frac{U_s}{U_o} = \frac{I_o}{I_s} = \frac{U_s}{U_s \cdot D} = \frac{1}{D} \Rightarrow I_L = I_o \cdot D$$

$$I_o = \frac{U_o}{R} = I_L = I_s \Rightarrow I_L = \frac{U_o}{R} \quad \begin{array}{l} U_s - ulomač napon \\ (\text{napon mora biti konstantan!}) \end{array}$$

ZADATAK: $D = ?$ * SILAZNI PLETVARAČ

$$R = 0.2 \Omega$$

$$R_2 = 0.1$$



$$U_o = U_s \cdot D \quad U_s = U_c \Rightarrow U_o = U_c \cdot D$$

$$D = \frac{U_o}{U_c}$$

$$U_c = 25 - I_s \cdot R$$

$$P_{iz} = \frac{U_o^2}{R_2} = \frac{5^2}{0.1}$$

$$P_{ul} = U_s \cdot I_s - I_s^2 \cdot R_1$$

PS (izvor) kondenzator

82 $P_{ul} = P_{rt}$

$$25 \cdot I_s - I_s^2 \cdot 0.2 = \frac{25}{0.1}$$

$$I_s^2 \cdot 0.2 - 25 I_s + 250 = 0$$

$$I_{s1} = 14.01 \text{ A}$$

$$I_{s2} = 10.94 \text{ A}$$

fizikalna prevelika struje

$$U_c = 25 \cdot I_s \cdot R_a$$

$$U_c = 25 - 10.94 \cdot 0.2 = 22.81 \text{ V}$$

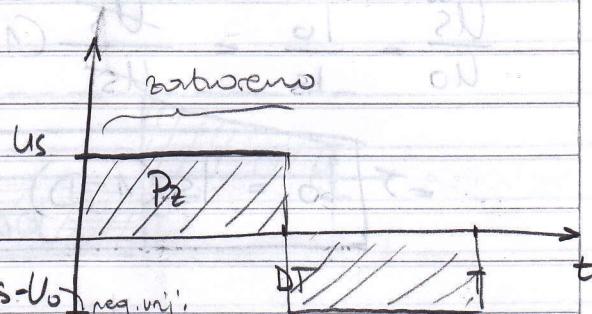
$$\Rightarrow D = \frac{U_o}{U_c} = \frac{5}{22.81} = 0.22$$

ene. akumuliraju
zalognici = predstave
ene mreži

(periodično ponavljaju)

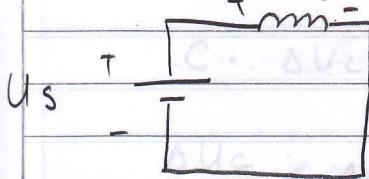
UZLAZNI PRETVARAČ

$$U_{ul} > U_{ul}$$



SKUPINA ZATVORENA

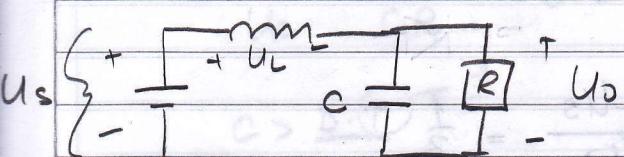
IZBIJANJE KONDENZATORA preko otpornica



$$U_s = U_L \rightarrow U_L = U_s - L \frac{di_L}{dt}$$

$$\frac{\Delta i_L}{\Delta t} = \frac{U_s}{L} \quad \Delta i_L = \frac{U_s}{L} \cdot D \cdot T$$

SKUPINA OTVORENA teč struja dok se ne potroši množ. ene. zalognice



$$U_L = U_s - U_o = L \frac{di_L}{dt}$$

$$\frac{\Delta i_L}{\Delta t} = \frac{U_s - U_o}{L}, \quad \Delta i_L = \frac{U_s - U_o}{L} (1 - D) \cdot T$$

$$P_2 = P_0$$

$$D \leq 1$$

$$P_2 = P_0$$

$$U_s \cdot D \cdot T = |(U_s - U_0)| \cdot (1-D) \cdot T$$

$$U_s \cdot D = (U_0 - U_s) \cdot (1-D)$$

$$U_s \cdot D = U_0 - U_0 \cdot D - U_s + U_s \cdot D$$

$$U_0 \cdot (1-D) = U_s \Rightarrow$$

$$U_0 = \frac{U_s}{1-D}$$

$$P_{ul} = P_2$$

$$U_s \cdot I_s = U_0 \cdot I_0$$

$$\frac{U_s}{U_0} = \frac{I_0}{I_s} = \frac{U_s}{U_s} (1-D) = \frac{I_0}{I_s}$$

$$\Rightarrow I_0 = I_s (1-D)$$

$$I_s = I_L$$

$$I_s = I_L = \frac{I_0}{1-D}$$

$$I_0 = \frac{U_0}{R}$$

$$I_L = \frac{U_0}{R} \cdot \frac{1}{(1-D)}$$

Zadanie: uztażni petwicę

$$U_s = 50 \text{ V}$$

$$L = 2.50 \mu\text{H}$$

$$t_2 = 50 \mu\text{s}$$

$$R = 2.5 \Omega$$

$$f = \frac{1}{T}$$

$$t_2 = D \cdot T$$

$$U_0 = \frac{U_s}{1-D}$$

$$f = \frac{D}{t_2}$$

$$a) U_0 = 75 \text{ V}$$

$$f = ?$$

$$\Rightarrow D = \frac{U_0 - U_s}{U_0} = \frac{1}{3}$$

$$f = 9.97 \text{ kHz}$$

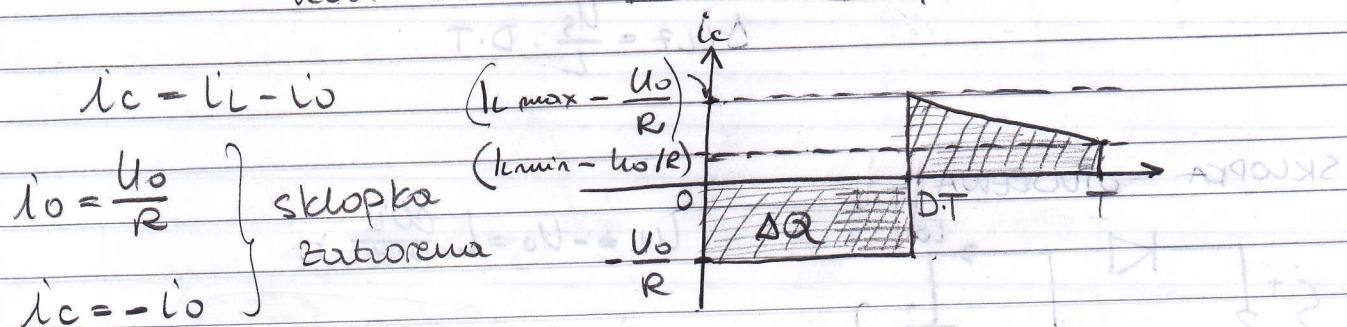
- b) sredna vijekost ulazne i izlazne struje?
- $i_o = ?$ ulazna
 $i_s = ?$ izlazna

$$i_o = \frac{U_o}{R} = 30A$$

$$P_{ul} = P_{iz}$$

$$i_s U_s = i_o U_o \Rightarrow i_s = \frac{i_o U_o}{U_s} = \frac{30 \cdot 75}{50} = 45A$$

- c) $C = ?$ uz uvjet da valovost pomeraj napona ne bude veća od 1% $\Delta U_c / U < 1\%$



Pronjekta naboj na kapacitetu C jedinaka po vrijednosti

$$i_o = \frac{U_o}{R} \left| \Delta Q = D \cdot T \right| - \frac{U_o}{R} \quad \Delta Q = C \cdot \Delta U_c$$

$$C \cdot \Delta U_c = D \cdot T \cdot \frac{U_c}{R}$$

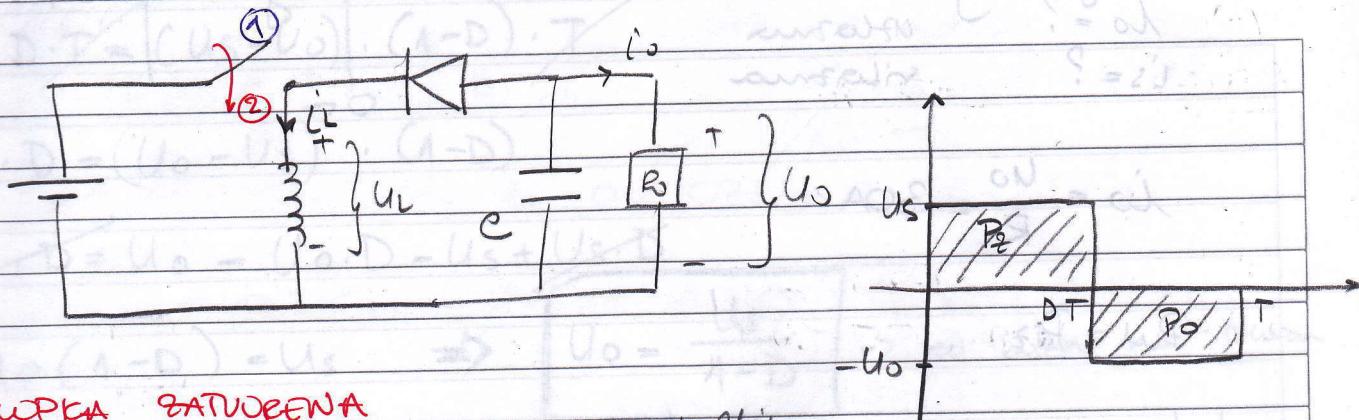
$$\frac{\Delta U_c}{U} < 1\%$$

$$\frac{\Delta U_c}{U_c} = \frac{D \cdot T}{C R} < 0.01$$

$$C > \frac{D \cdot T}{R \cdot 0.01} \Rightarrow C > 2 \cdot 10^{-3} F$$

U_o obrnuti petvibet od U_s

* SILAZNO-UZLAZNI



SKUPKA ZATVORENA

$$U_s \left\{ \begin{array}{l} + \\ - \end{array} \right\} U_L \left\{ \begin{array}{l} + \\ - \end{array} \right\}$$

$$\Delta i_L = \frac{U_s}{L} \cdot D \cdot T$$

$$\Delta i_L = \frac{U_s}{L} \cdot D \cdot T$$

SKLOPKA OTVORENA

$$U_s \left\{ \begin{array}{l} + \\ - \end{array} \right\} U_o \left\{ \begin{array}{l} + \\ - \end{array} \right\}$$

$$U_L = -U_o = L \frac{di_L}{dt}$$

$$\frac{\Delta i_L}{\Delta t} = -\frac{U_o}{L}$$

$$\Delta i_L = -\frac{U_o}{L} \cdot (1-D) \cdot T$$

Dvojice površine $P_2 = P_0$

$$U_s \cdot D \cdot T = -U_o \cdot (1-D) \cdot T$$

$$\Rightarrow U_o = -U_s \frac{D}{1-D}$$

smage $P_{ul} - P_{iz}$

$$I_s \cdot U_s = I_o \cdot U_o$$

$$\frac{I_s}{I_o} = \frac{U_o}{U_s} = \frac{-U_s \frac{D}{1-D}}{-U_s} = \frac{D}{1-D}$$

$$I_s = I_L$$

$$\Rightarrow I_L = I_o \cdot \frac{D}{1-D}$$