

ELEKTROTEHNIČKI FAKULTET U BEOGRADU
KATEDRA ZA ELEKTRONIKU

ENERGETSKA ELEKTRONIKA
LABORATORIJSKE VEŽBE

VEŽBA BROJ 5:
UPRAVLJANJE BUCK KONVERTOROM:
PROGRAMIRANJE STRUJE

IME I PREZIME	BR. INDEKSA	GRUPA	OCENA
1.			
2.			

DATUM _____

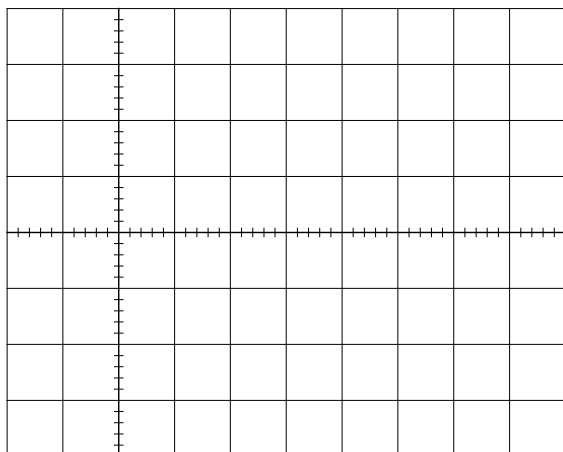
VREME _____

DEŽURNI U LABORATORIJU _____

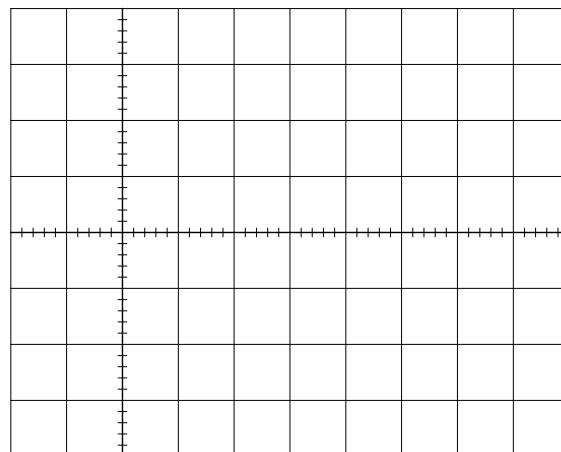
D.0

$$V_0 = \underline{\hspace{2cm}} \text{ V} \quad R_x = \underline{\hspace{2cm}} \Omega$$

D.1. Diskontinualni režim rada sa *hysteresis window* regulatorom



Slika 5.2. Struja kalema, $R_L = 470 \Omega$



Slika 5.3. Naizmjenična komponenta izlaznog napona, $R_L = 470 \Omega$

Tabela 5.2. Subharmonijske oscilacije u diskontinualnom režimu

džamper	f_{SUB} [Hz]	$V_{out\ p-p}$
J7, 100 nF		
J8, 10 nF		
J9, 1 nF		

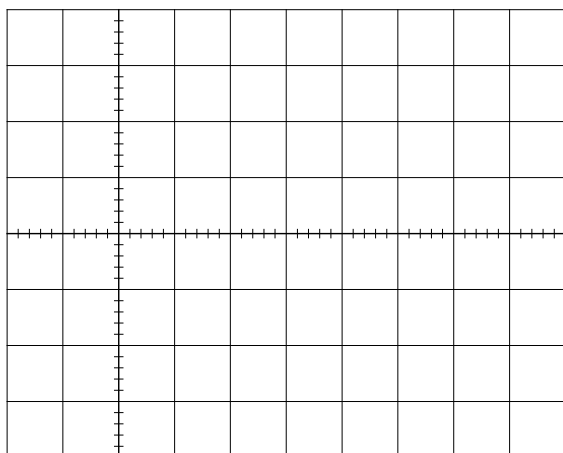
D.2. Zavisnost frekvencije prekidanja od izlaznog napona, *hysteresis window* regulator

Tabela 5.3. Zavisnost frekvencije prekidanja od izlaznog napona.

V_{OUT} [V]	f_s [kHz]
5	
6	
7	
8	
9	
10	

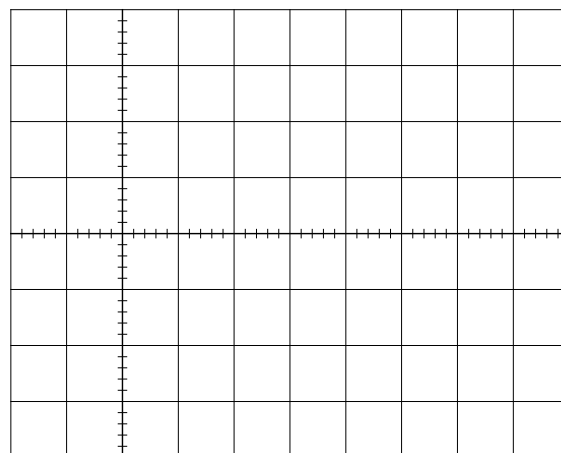
D.3. Dinamički odziv konvertora, *hysteresis window* regulator

D.3.1. Integralni regulator sa 100 nF.



Slika 5.4. Struja kalema, $R_L = 16,5 \, \Omega$,
 $R_{L2} = 8,2 \, \Omega$

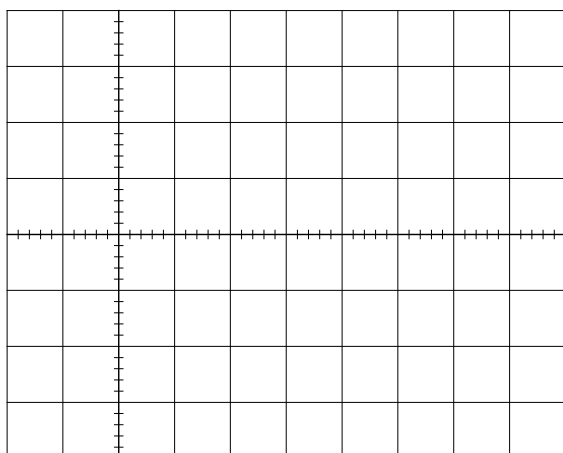
$$V_{out \, p-p} = \text{_____} \, \text{mV}$$



Slika 5.5. Naizmenična komponenta
izlaznog napona, isto

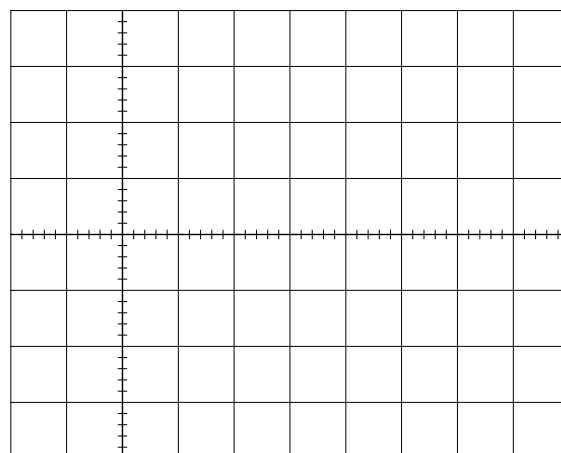
D.4. Proporcionalno-integralni regulator, *hysteresis window* regulator

D.4.1. Dinamički odziv konvertora.



Slika 5.6. Struja kalema, $R_L = 16,5 \, \Omega$,
 $R_{L2} = 8,2 \, \Omega$

$$V_{out \, p-p} = \text{_____} \, \text{mV}$$



Slika 5.7. Naizmenična komponenta
izlaznog napona, isto

D.5. Stabilnost strujne petlje, *peak limiting* regulator

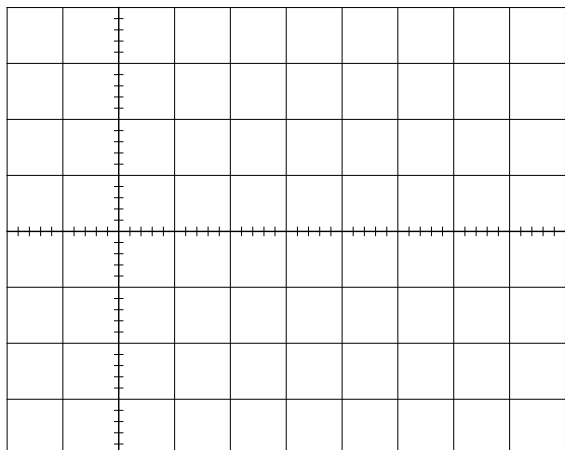
D.5.1. Stabilnost strujne petlje u diskontinualnom režimu.

$$D_{SUB} = \text{_____}, V_{OUT \, SUB} = \text{_____} \, \text{V}$$

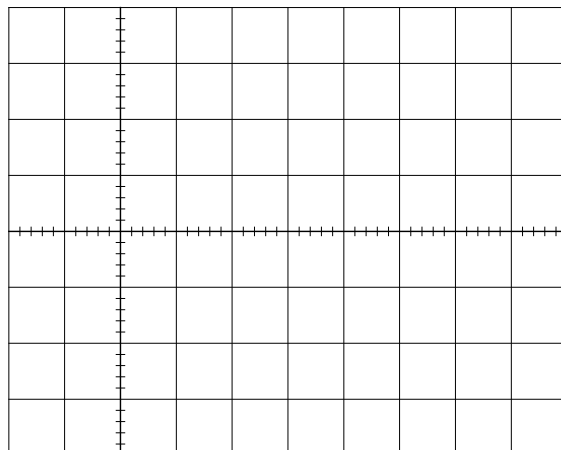
Zaključak:

D.5.2. Stabilnost strujne petlje u kontinualnom režimu.

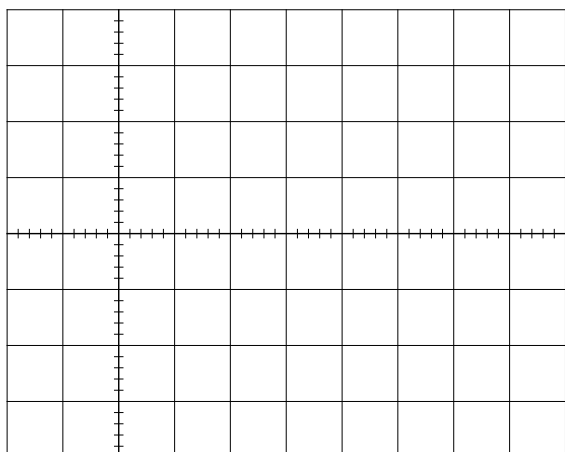
$$D_{SUB} = \text{_____}, V_{OUT SUB} = \text{_____} \text{ V}$$



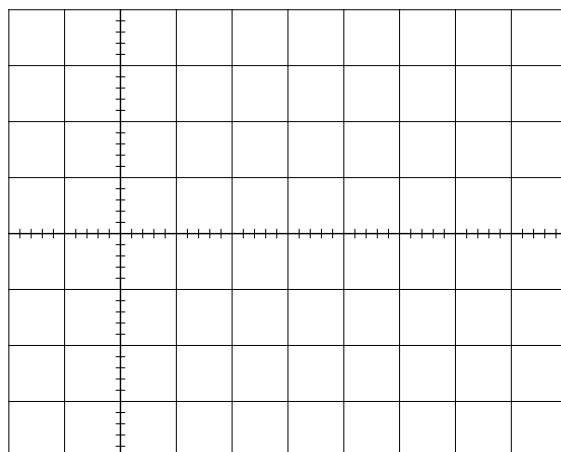
Slika 5.8. Napon na diodi konvertora, 5 V



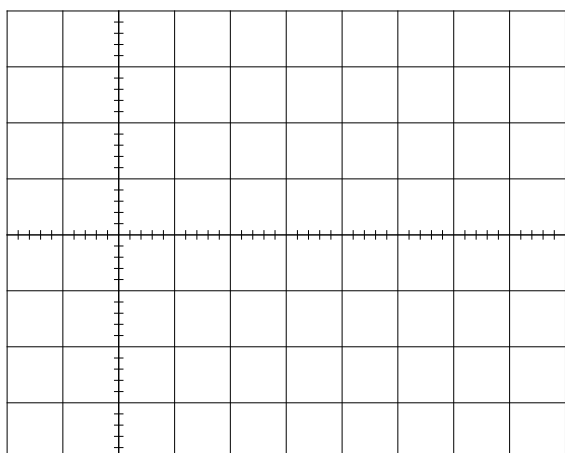
Slika 5.9. Struja kalema, 5 V



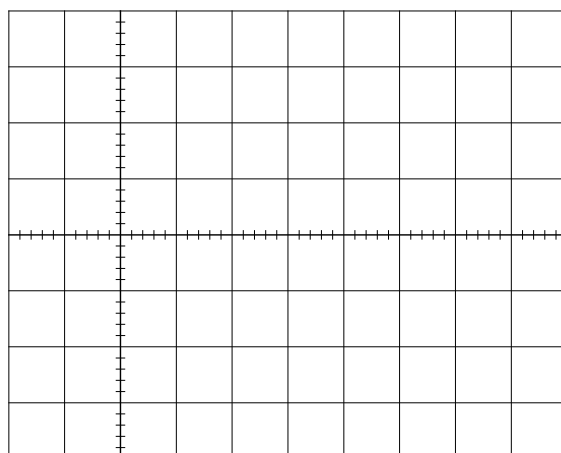
Slika 5.10. Napon na diodi konvertora, 8 V



Slika 5.11. Struja kalema, 8 V



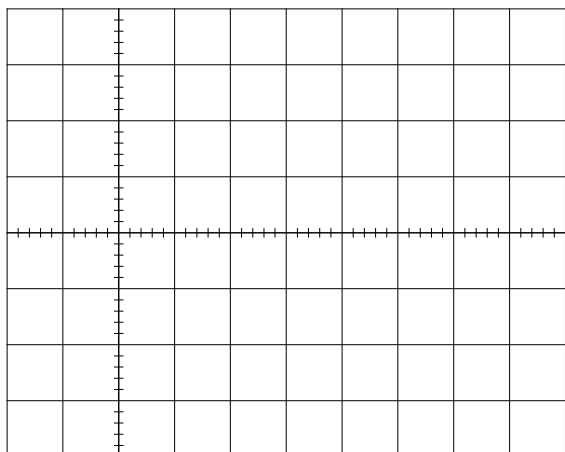
Slika 5.12. Napon na diodi konvertora,
10 V



Slika 5.13. Struja kalema, 10 V

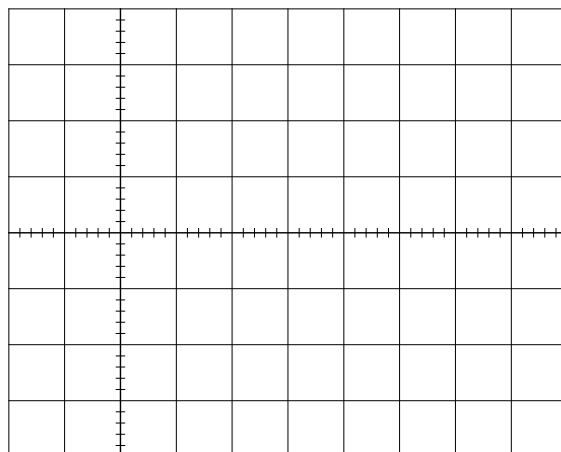
D.6. Dinamički odziv konvertora, *peak limiting* regulator

D.6.1. Integralni regulator sa 100 nF.



Slika 5.14. Struja kalema, $R_L = 16,5 \, \Omega$,
 $R_{L2} = 8,2 \, \Omega$

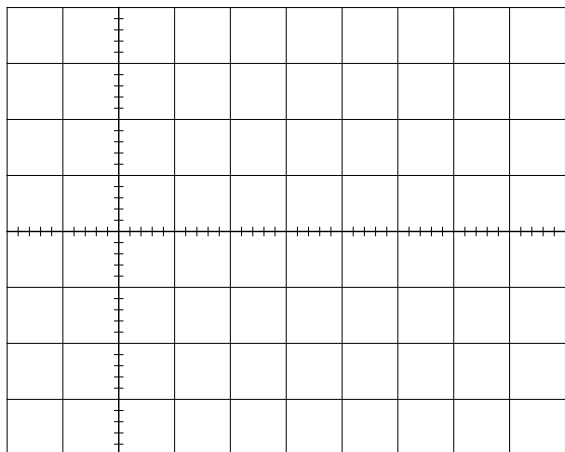
$V_{out \, p-p} = \underline{\hspace{2cm}} \, \text{mV}$



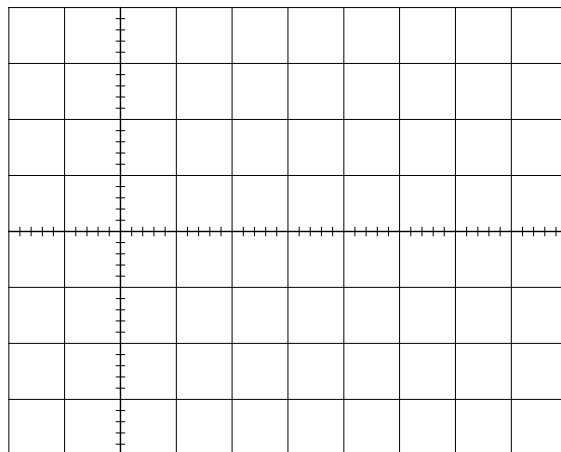
Slika 5.15. Naizmenična komponenta
izlaznog napona, isto

D.7. Proporcionalno-integralni regulator, *peak limiting* regulator

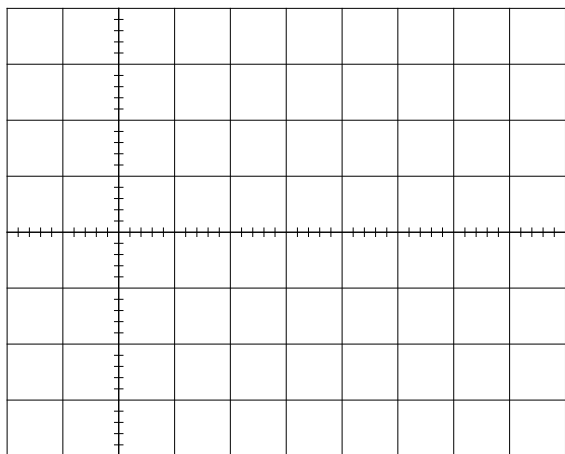
D.7.1. Subharmonijske oscilacije sa proporcionalno-integralnim regulatorom.



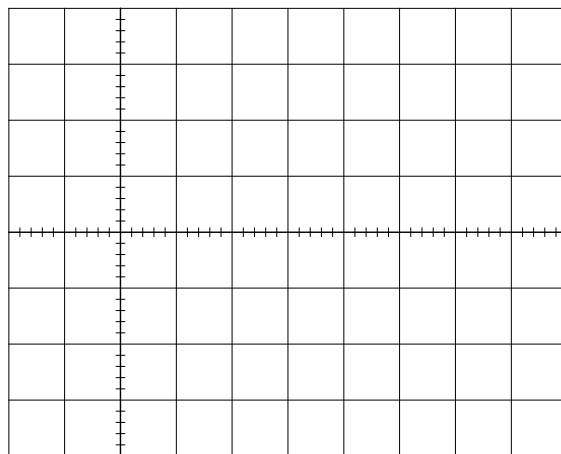
Slika 5.16. Struja kalema, P2 min



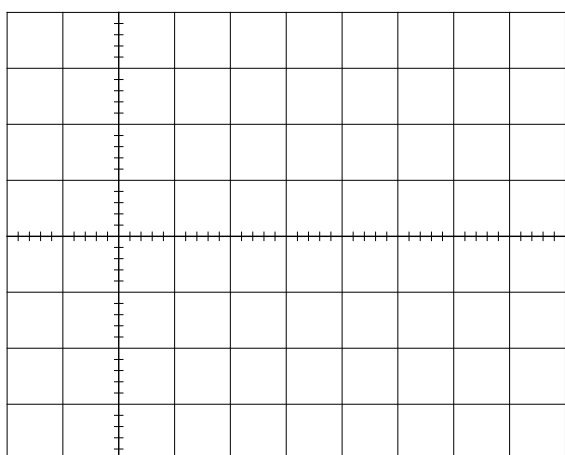
Slika 5.17. Napon na izlazu regulatora, P2
min



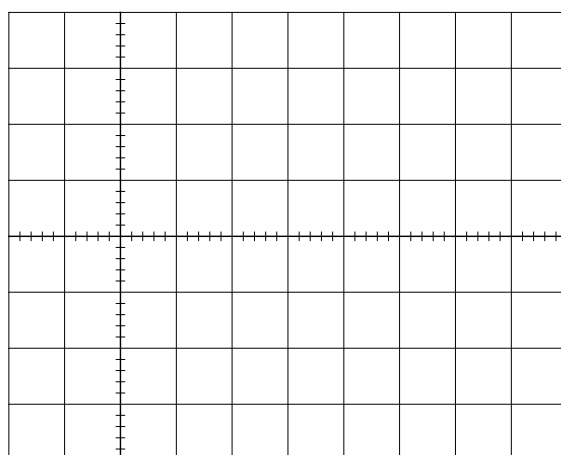
Slika 5.18. Struja kalema, P2 *sub*



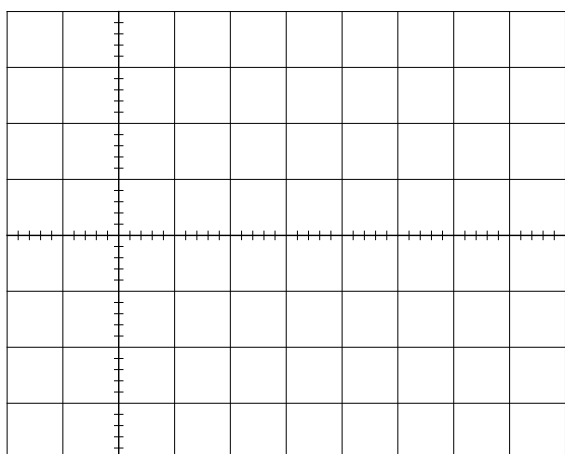
Slika 5.19. Napon na izlazu regulatora, P2 *sub*



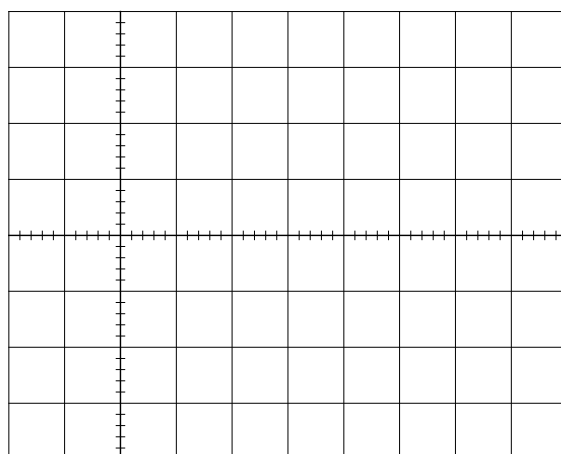
Slika 5.20. Struja kalema, P2 *doubl*



Slika 5.21. Napon na izlazu regulatora, P2 *doubl*



Slika 5.22. Struja kalema, P2 max

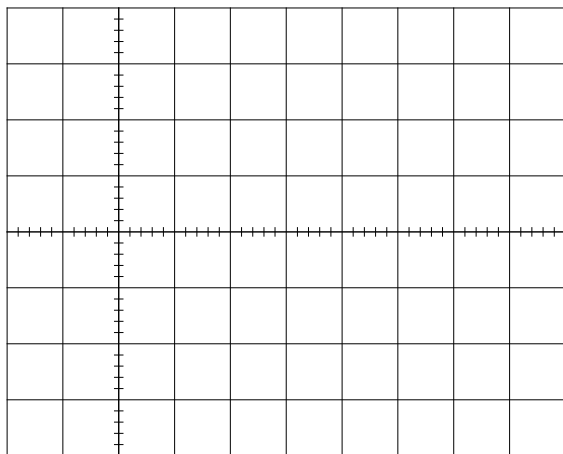


Slika 5.23. Napon na izlazu regulatora, P2 max

D.7.2. Eliminacija subharmonijskih oscilacija kod proporcionalno-integralnog regulatora uvođenjem dodatnog pola.

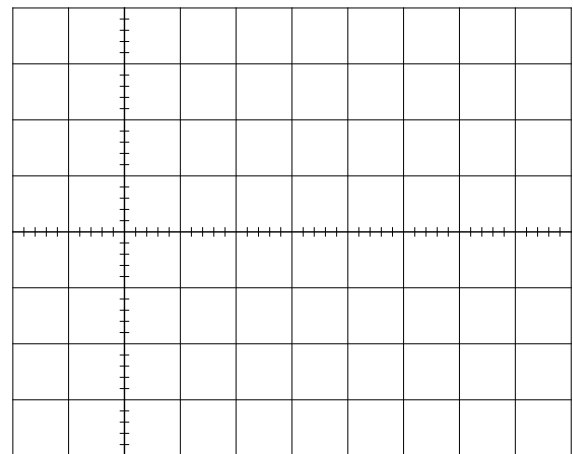
Zaključak:

D.7.3. Dinamički odziv konvertora.



Slika 5.24. Struja kalema, $R_L = 16,5 \, \Omega$,
 $R_{L2} = 8,2 \, \Omega$

$V_{out \, p-p} = \underline{\hspace{2cm}} \, \text{mV}$



Slika 5.25. Naizmenična komponenta
izlaznog napona, isto