Z_2-kol2

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#ZADATAK 02
#Prema sintaksi koristenog softvera veliko ili malo slovo I ('I' ili\
    'i') je oznaka imaginarne jedinice
#Definiranje varijabli za simbolicki izracun
var('I_1','I_2','I_3','X_L','X_M1','X_M2','E','U_Lsr','U_LsrRJ')
#Definiranje varijabli koje su realni brojevi
assume(X_M1,'real',X_M2,'real',X_L,'real')
(I_1, I_2, I_3, X_L, X_M1, X_M2, E, U_Lsr, U_LsrRJ)

#Pisanje jednadzbi KZN-a i KZS-a:
KZN_A=E-I_1*I*X_L-I_2*I*X_M1-I_2*I*X_L-I_1*I*X_M1-I_3*I*X_M2==0
KZN_B=I_2*I*X_L+I_1*I*X_M1+I_3*I*X_M2-I_3*I*X_L-I_2*I*X_M2==0
KZS=I_1-I_2-I_3==0
show(KZN_A);show(KZN_B);show(KZS)
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$$-i\,I_1 X_L - i\,I_2 X_L - i\,I_1 X_{M_1} - i\,I_2 X_{M_1} - i\,I_3 X_{M_2} + E = 0$$
$$i\,I_2 X_L - i\,I_3 X_L + i\,I_1 X_{M_1} - i\,I_2 X_{M_2} + i\,I_3 X_{M_2} = 0$$
$$I_1 - I_2 - I_3 = 0$$

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#Uz zamjenu XM1 = 0,5XL i XM2=0,2XL ovo izgleda i jednostavnije:
KZN_A=KZN_A.subs(X_M1=0.5*X_L,X_M2=0.2*X_L)
KZN_B=KZN_B.subs(X_M1=0.5*X_L,X_M2=0.2*X_L)
show(KZN_A);show(KZN_B);show(KZS)
```
$$-1.50000000000000i\,I_1 X_L - 1.50000000000000i\,I_2 X_L - 0.200000000000000i\,I_3 X_L + E = 0$$
$$0.500000000000000i\,I_1 X_L + 0.800000000000000i\,I_2 X_L - 0.800000000000000i\,I_3 X_L = 0$$
$$I_1 - I_2 - I_3 = 0$$

```
#Rjesenje sustava jednadzbi je:
SUSJED=[KZN_A,KZN_B,KZS]
RJESENJE=solve(SUSJED,I_1,I_2,I_3);RJESENJE;show(RJESENJE)
[[I_1 == -160/311*I*E/X_L, I_2 == -30/311*I*E/X_L, I_3 == -130/311*I*E/X_L]]
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$$[[I_1 = -\frac{160i\,E}{311\,X_L},\ I_2 = -\frac{30i\,E}{311\,X_L},\ I_3 = -\frac{130i\,E}{311\,X_L}]]$$

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#Struje kroz induktiviete su dakle:
I_1= -160/311*I*E/X_L;I_1
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-160/311*I*E/X_L
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I_2=-30/311*I*E/X_L;I_2.simplify_full()
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-30/311*I*E/X_L
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I_3=-130/311*I*E/X_L;I_3
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-130/311*I*E/X_L
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show(U_Lsr==I_2*I*X_L+I_1*I*X_M1+I_3*I*X_M2);show((U_Lsr==I_2*I*X_L+\
    I_1*I*X_M1+I_3*I*X_M2).subs(X_M1=0.5*X_L,X_M2=0.2*X_L))
```

$$U_{Lsr} = \frac{30}{311}\,E + \frac{160\,EX_{M_1}}{311\,X_L} + \frac{130\,EX_{M_2}}{311\,X_L}$$
$$U_{Lsr} = 0.437299035369775\,E$$

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#Izracun za zadane numericke podatke.
U_Lsr=(I_2*I*X_L+I_1*I*X_M1+I_3*I*X_M2).subs(X_M1=0.5*X_L,X_M2=0.2*\
    X_L)
E=141.42/sqrt(2);E.n()
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99.9990409954015
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U_Lsr=U_Lsr.subs(E=141.42/sqrt(2));show(U_LsrRJ==U_Lsr.n())
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$$U_{LsrRJ} = 43.7294841651917$$