Z_4-2kol

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#ZADATAK 04
#Prema sintaksi koristenog softvera veliko ili malo slovo I ('I' ili\
    'i') je oznaka imaginarne jedinice
#Definiranje varijabli za simbolicki izracun
var('U_12','U_23','U_31','U','R','Z','U_t1','U_t2','U_t3','I_12','\
    I_23','I_31','Z_1','Z_2','Z_3','S_1','S_2','S_3','S_3f','S_1RJ','\
    S_2RJ','S_3RJ','S_3fRJ','Z_0')
assume(U,'real',R,'real')
```
(U_12, U_23, U_31, U, R, Z, U_t1, U_t2, U_t3, I_12, I_23, I_31, Z_1, Z_2,
S_3, S_3f, S_1RJ, S_2RJ, S_3RJ, S_3fRJ, Z_0)

```
#Kako je izvor u zvijezda spoju a trosilo u trokutu, na fazama \
    trosila vladaju linijski naponi mreze koji se preko napona feze \
    izvora mogu izraziti kao:
#Naponi su prikazani u polarnom (Eulerovom zapisu)
U_12=sqrt(3)*U*e^(0*I);U_12;show(U_12)
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sqrt(3)*U
$$\sqrt{3}U$$

```
U_23=sqrt(3)*U*e^(-I*2*pi/3);U_23;show(U_23)
```
sqrt(3)*U*e^(-2/3*I*pi)
$$\sqrt{3}Ue^{\left(-\frac{2}{3}i\pi\right)}$$

```
U_31=sqrt(3)*U*e^(I*2*pi/3);U_31;show(U_31)
```
sqrt(3)*U*e^(2/3*I*pi)
$$\sqrt{3}Ue^{\left(\frac{2}{3}i\pi\right)}$$

```
#Ovi naponi vladaju na fazama trosila:
U_t1=U_12;U_t2=U_23;U_t3=U_31
#Pa su fazne struje kroz faze trosila:
I_12=U_t1/Z_1;I_12;show(I_12)
```
sqrt(3)*U/Z_1
$$\frac{\sqrt{3}U}{Z_1}$$

```
I_23=U_t2/Z_2;I_23;show(I_23)
sqrt(3)*U*e^(-2/3*I*pi)/Z_2
```
$$\frac{\sqrt{3}\,U e^{\left(-\frac{2}{3}i\,\pi\right)}}{Z_2}$$

```
I_31=U_t3/Z_3;I_31;show(I_31)
sqrt(3)*U*e^(2/3*I*pi)/Z_3
```
$$\frac{\sqrt{3}\,U e^{\left(\frac{2}{3}i\,\pi\right)}}{Z_3}$$

```
#Kompleksne snage svake faze trosila su:
S_1=U_t1*conjugate(I_12);S_1;show('S1= ',S_1)
3*U^2/conjugate(Z_1)
```
$$\text{S1}= \frac{3\,U^2}{\overline{Z_1}}$$

```
S_2=U_t2*conjugate(I_23);S_2=S_2.collect(U);show('S2= ',S_2)
```
$$\text{S2}= \frac{3\,U^2}{\overline{Z_2}}$$

```
S_3=U_t3*conjugate(I_31);S_3=S_3.collect(U);show('S3= ',S_3)
```
$$\text{S3}= \frac{3\,U^2}{\overline{Z_3}}$$

```
#Ukupna je kompleksna snaga trofaznog trosila jednaka sumi fazih \
   kompleksnih snaga:
S_3f=S_1+S_2+S_3;S_3f=S_3f.collect(U);show('S3f= ',S_3f)
```
$$\text{S3f}= 3\,U^2\left(\frac{1}{\overline{Z_1}}+\frac{1}{\overline{Z_2}}+\frac{1}{\overline{Z_3}}\right)$$

```
#Slijedi izracun za zadane numericke podatke
S_3f=(S_3f.subs(U=200,Z_1=5+I*5,Z_2=5+I*10,Z_3=5-I*10)).n();show(\
   S_3f)
```
$$21600.0000000000 + 12000.0000000000i$$