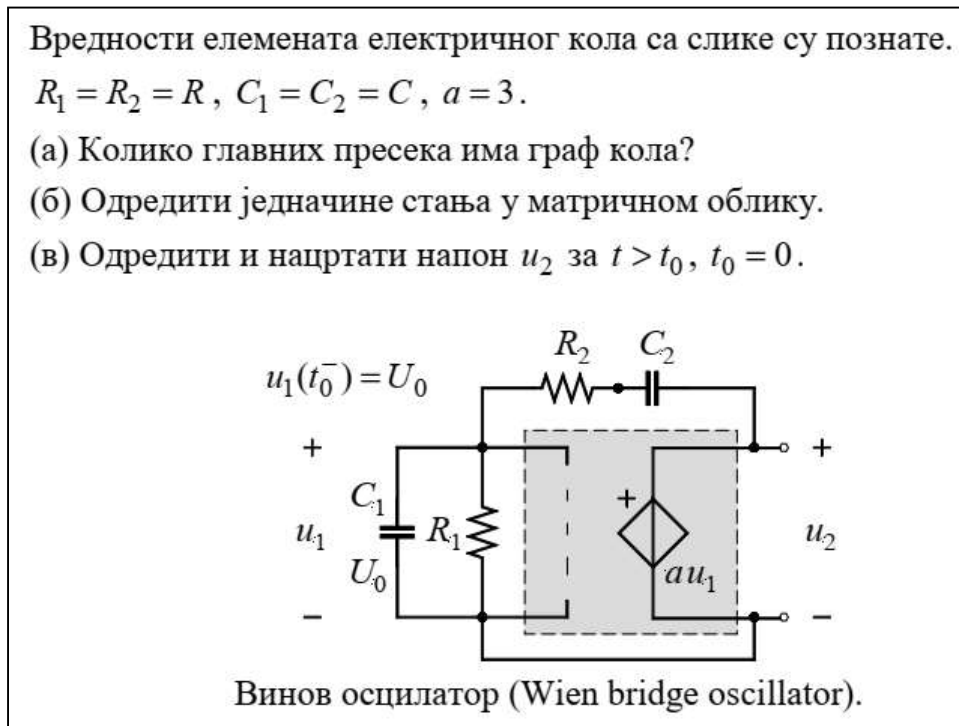


Vinov oscillator

Figure 1:



```
(%i1) jednacine: [C1*(U1*s-U0) + U1/R1 + (U1-U2)/(R2+1/(C2*s))=0,
                  U2=a*U1];
```

```
(%o1) [C1 (U1 s - U0) + \frac{U1 - U2}{\frac{1}{C2 s} + R2} + \frac{U1}{R1} = 0, U2 = U1 a]
```

```
(%i2) promenljive: [U1, U2];
```

```
(%o2) [U1, U2]
```

```
(%i3) odziv: solve(jednacine, promenljive);
```

```
(%o3) [[U1 = \frac{C1 C2 R1 R2 U0 s + C1 R1 U0}{C1 C2 R1 R2 s^2 + (R1 (C2 (1-a) + C1) + C2 R2) s + 1}, U2 =
\frac{C1 C2 R1 R2 U0 a s + C1 R1 U0 a}{C1 C2 R1 R2 s^2 + (R1 (C2 (1-a) + C1) + C2 R2) s + 1}] ]
```

```
(%i4) U2s: U2, odziv;
```

```
(%o4) \frac{C1 C2 R1 R2 U0 a s + C1 R1 U0 a}{C1 C2 R1 R2 s^2 + (R1 (C2 (1-a) + C1) + C2 R2) s + 1}
```

```
(%i5) denU2s: expand(denom(U2s));
```

```
(%o5) C1 C2 R1 R2 s^2 - C2 R1 a s + C2 R2 s + C2 R1 s + C1 R1 s + 1
```

```
(%i6) uslovOscilovanja: coeff(denU2s, s,1) = 0;
(%o6) -C2 R1 a + C2 R2 + C2 R1 + C1 R1 = 0

(%i7) pojacanjeOscilovanja: a, solve(uslovOscilovanja,a);
(%o7) 
$$\frac{C2 R2 + (C2 + C1) R1}{C2 R1}$$


(%i8) ugaonaUcestanostOscilovanja:
sqrt(coeff(denU2s,s,0)/coeff(denU2s,s,2));
(%o8) 
$$\sqrt{\frac{1}{C1 C2 R1 R2}}$$


(%i9) vrednostElemenata: [C1=C, C2=C, R1=R, R2=R];
(%o9) [C1=C, C2=C, R1=R, R2=R]

(%i10) assume(C>0, R>0);
(%o10) [C>0, R>0]

(%i11) a0: pojacanjeOscilovanja, vrednostElemenata;
(%o11) 3

(%i12) w0: ugaonaUcestanostOscilovanja, vrednostElemenata ;
(%o12) 
$$\frac{1}{C R}$$


(%i13) U2s0: U2s, vrednostElemenata, a=a0, ratsimp;
(%o13) 
$$\frac{3 C^2 R^2 U0 s + 3 C R U0}{C^2 R^2 s^2 + 1}$$


(%i14) u2: ilt(U2s0, s, t), factor;
(%o14) 
$$3 U0 \left( \sin\left(\frac{t}{C R}\right) + \cos\left(\frac{t}{C R}\right) \right)$$


(%i15) brojno: [C=1, R=1, U0=1];
(%o15) [C=1, R=1, U0=1]

(%i16) u2t: u2, brojno;
(%o16) 
$$3 (\sin(t) + \cos(t))$$


(%i17) U1s: U1, odziv;
(%o17) 
$$\frac{C1 C2 R1 R2 U0 s + C1 R1 U0}{C1 C2 R1 R2 s^2 + (R1 (C2 (1-a) + C1) + C2 R2) s + 1}$$

```

```
(%i18) U1s0: U1s, vrednostElementa, a=a0, ratsimp;
```

```
(%o18) 
$$\frac{C^2 R^2 U0 s + C R U0}{C^2 R^2 s^2 + 1}$$

```

```
(%i19) u1: ilt(U1s0,s,t), factor;
```

```
(%o19) 
$$U0 \left( \sin\left(\frac{t}{C R}\right) + \cos\left(\frac{t}{C R}\right) \right)$$

```

```
(%i20) ult: u1, brojno;
```

```
(%o20)  $\sin(t) + \cos(t)$ 
```

```
(%i21) wxplot2d([u2t, ult],[t, 0, 3*2*%pi],
  [y, -4.5, 5.5],
  [xlabel, "t/(RC)"],
  [ylabel, "u/U0"],
  [style, [lines, 3, 1], [lines, 3, 2]],
  [legend, "u2", "u1"])$
```

```
(%t21)
```

