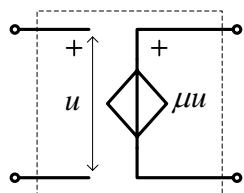
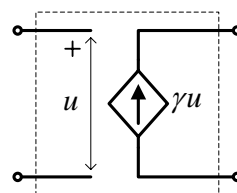


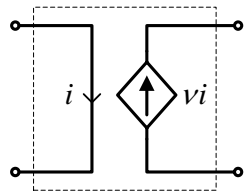
1. Rezistivni elementi sa dva pristupa



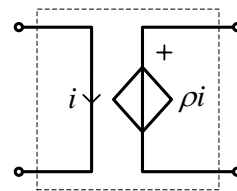
Naponski kontrolisan naponski izvor



Naponski kontrolisan strujni izvor

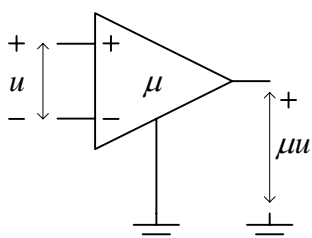


Strujno kontrolisan naponski izvor

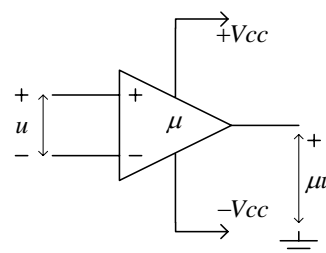


Strujno kontrolisan strujni izvor

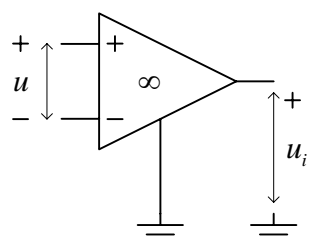
Pojačavači:



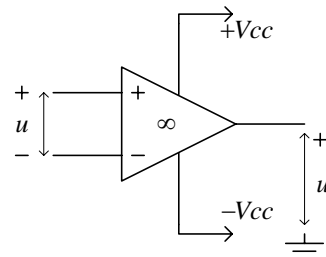
Diferencijalni pojačavač



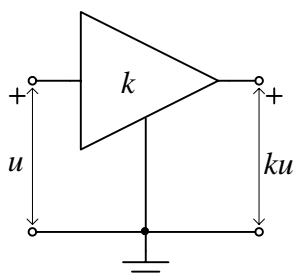
Diferencijalni pojačavač sa ograničenim izl. naponom



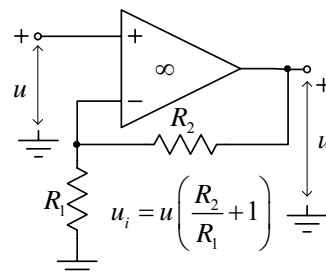
Idealni operacioni pojačavač



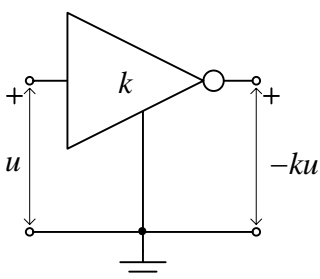
Idealni operacioni pojačavač sa ograničenim izlaznim naponom



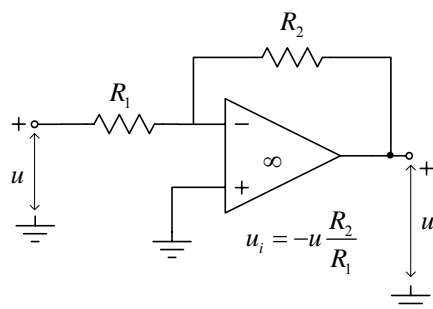
Pojačavač napona



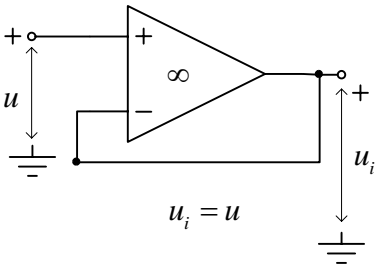
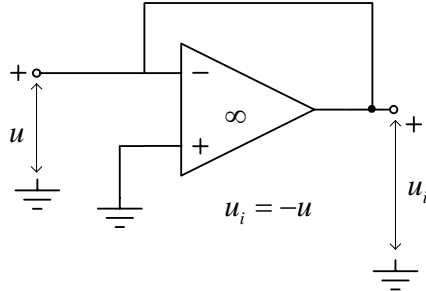
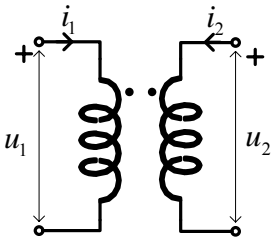
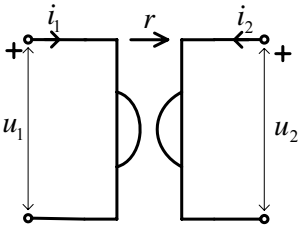
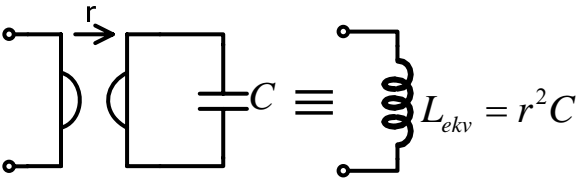
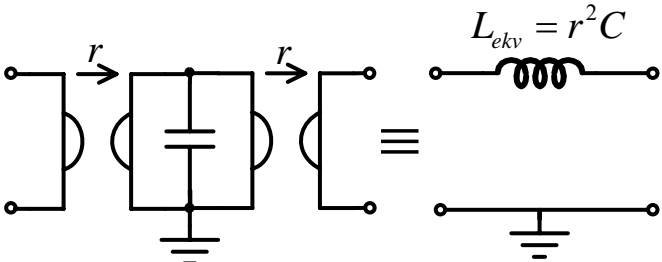
Neinvertujući pojačavač napona realizovan sa OP



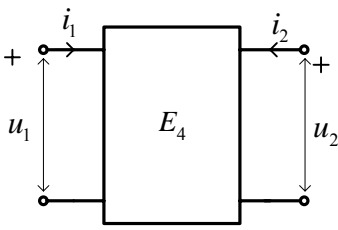
Invertujući pojačavač napona



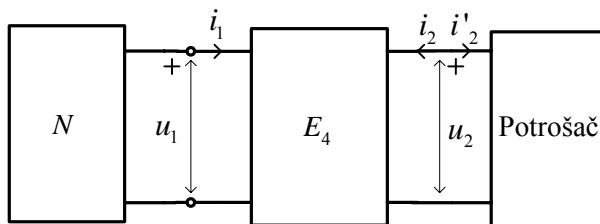
Invertujući pojačavač napona realizovan pomoću OP

 <p style="text-align: center;">$u_i = u$</p> <p style="text-align: center;">Neinvertujući bafer</p>	 <p style="text-align: center;">$u_i = -u$</p> <p style="text-align: center;">Invertujući bafer</p>
 <p style="text-align: center;">Idealni transformator</p> $i_1 = -\frac{1}{m} i_2$ $u_1 = m u_2$ $G_{ie} = \frac{G_i}{m^2}$ $R_{ie} = m^2 R$ $L_{ie} = m^2 L$ $C_{ke} = \frac{C_k}{m^2}$	 <p style="text-align: center;">Idealni žirator</p> $u_1 = -r i_2$ $i_1 = \frac{u_2}{r}$ $G_{ie} = \frac{R_i}{r^2}$ $C_{je} = \frac{L_j}{r^2}$ $L_{ke} = r^2 C$
 <p style="text-align: center;">$L_{ekv} = r^2 C$</p>	 <p style="text-align: center;">$L_{ekv} = r^2 C$</p>

Parametri rezistivnih elemenata sa jednim pristupom

 <p style="text-align: center;">Element sa dva pristupa (četiri priključka)</p>	
<p>- <i>strujno kontrolisano predstavljanje</i></p> $u_1 = r_1(i_1, i_2)$ $u_2 = r_2(i_1, i_2)$	<p>- <i>naponski kontrolisano</i></p> $i_1 = g_1(u_1, u_2)$ $i_2 = g_2(u_1, u_2)$
<p>- <i>prvo hibridno predstavljanje</i></p> $u_1 = h_1(i_1, u_2)$ $i_2 = h_2(i_1, u_2)$	<p>- <i>drugo hibridno</i></p> $i_1 = k_1(u_1, i_2)$ $u_2 = k_2(u_1, i_2)$

Sledeća dva predstavljanja su pogodna u slučajevima kada element sa dva pristupa služi kao veza između ulazne mreže i prijemnika (vidi sliku). Prirodan režim je, u tom slučaju, takav da generator ulaže energiju u element E_4 , a potrošač prima energiju preko tog elemenata.



- prvo prenosno predstavljanje

$$u_1 = a_1(u_2, i_2')$$

$$i_1 = a_2(u_2, i_2')$$

- drugo prenosno predstavljanje

$$u_2 = b_1(u_1, i_1)$$

$$i_2' = b_2(u_1, i_1)$$

Osobine rezistivnih elemenata sa dvapristupa

Pasivnost:

$$\begin{aligned} r_{11} &\geq 0 & r_{22} &\geq 0 & 4r_{11}r_{22} &\geq (r_{12} + r_{21})^2 \\ g_{11} &\geq 0 & g_{22} &\geq 0 & 4g_{11}g_{22} &\geq (g_{12} + g_{21})^2 \\ h_{11} &\geq 0 & h_{22} &\geq 0 & 4h_{11}h_{22} &\geq (h_{12} + h_{21})^2 \\ k_{11} &\geq 0 & k_{22} &\geq 0 & 4k_{11}k_{22} &\geq (k_{12} + k_{21})^2 \\ a_{11}/a_{21} &\geq 0 & a_{22}/a_{21} &\geq 0 & 4a_{11}a_{22} &\geq (\det a + 1)^2 \\ b_{11}/b_{21} &\leq 0 & b_{22}/b_{21} &\leq 0 & 4b_{11}b_{22} &\geq (\det b + 1)^2 \end{aligned}$$

Recipročnost:

$$\begin{aligned} r_{21} &= r_{12} & h_{21} &= -h_{12} & \det a &= 1 \\ g_{21} &= g_{12} & k_{21} &= -k_{12} & \det b &= 1 \end{aligned}$$

Recipročnost + pasivnost

$$\begin{aligned} r_{11} &\geq 0 & r_{22} &\geq 0 & \det r &\geq 0 \\ g_{11} &\geq 0 & g_{22} &\geq 0 & \det g &\geq 0 \\ h_{11} &\geq 0 & h_{22} &\geq 0 & & \\ k_{11} &\geq 0 & k_{22} &\geq 0 & & \\ a_{11}/a_{21} &\geq 0 & a_{22}/a_{21} &\geq 0 & a_{11}a_{22} &\geq 1 \\ b_{11}/b_{21} &\leq 0 & b_{22}/b_{21} &\leq 0 & b_{11}b_{22} &\geq 1 \end{aligned}$$

Simetričnost:

Element mora prvo biti recipročan i mora da važi:

$$\begin{aligned} r_{11} &= r_{22} & \det h &= 1 \\ g_{11} &= g_{22} & \det k &= 1 \\ a_{11} &= a_{22} & b_{11} &= b_{22} \end{aligned}$$