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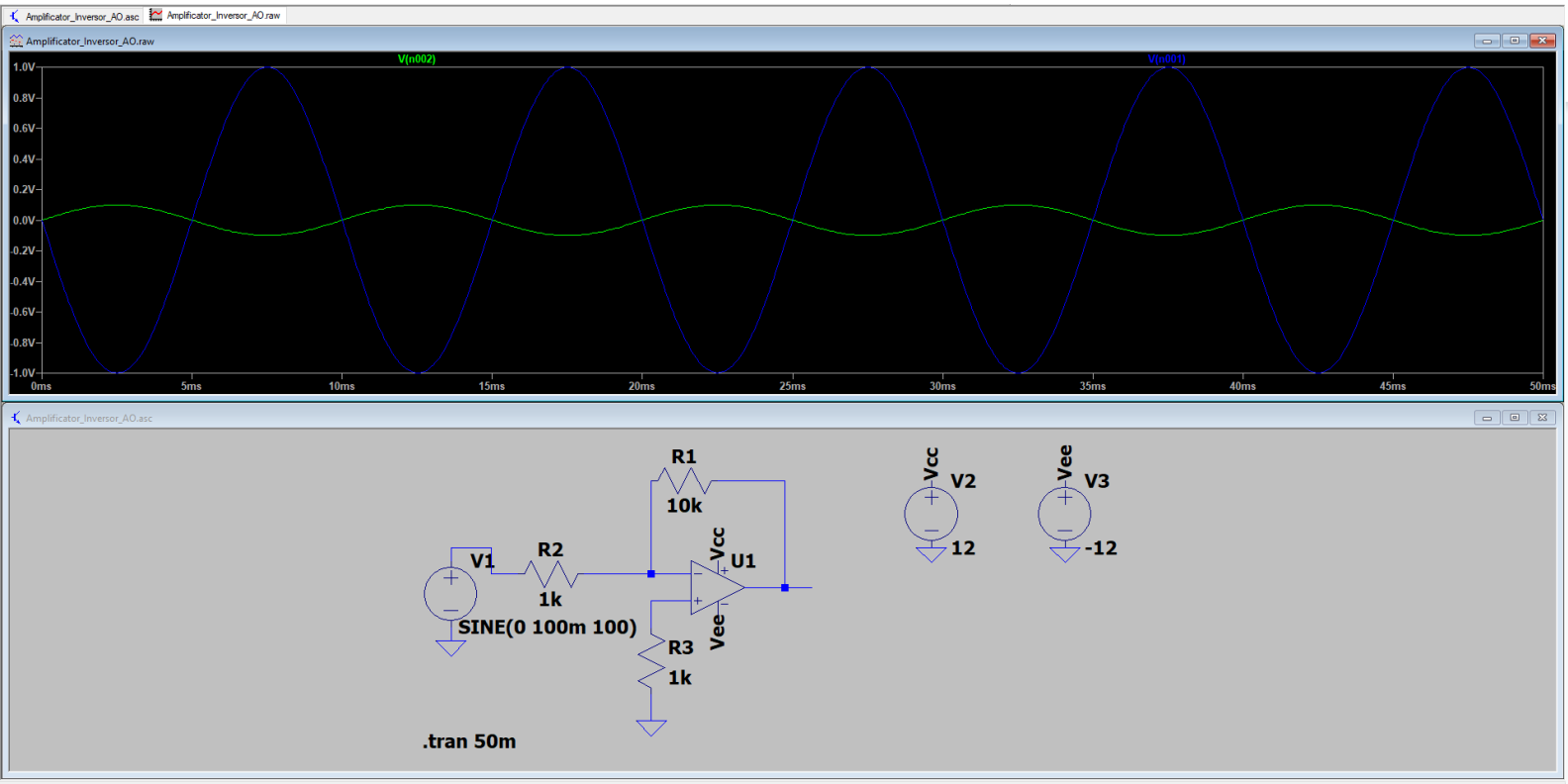
Tema R4- Deea

Amplificator inversor cu AO



$$V_{\text{out}} = -\frac{\text{R}_\text{f}}{\text{Rg}}\text{V}_\text{in}$$

$R_g = 1K\Omega \qquad R_f = 10k\Omega$

$V_{in} = 100mV$

$=>\ V_{out} = -10 * 100mV = -1V$ -> e cu minus pentru ca e in defazaj (sper ca zic bine)

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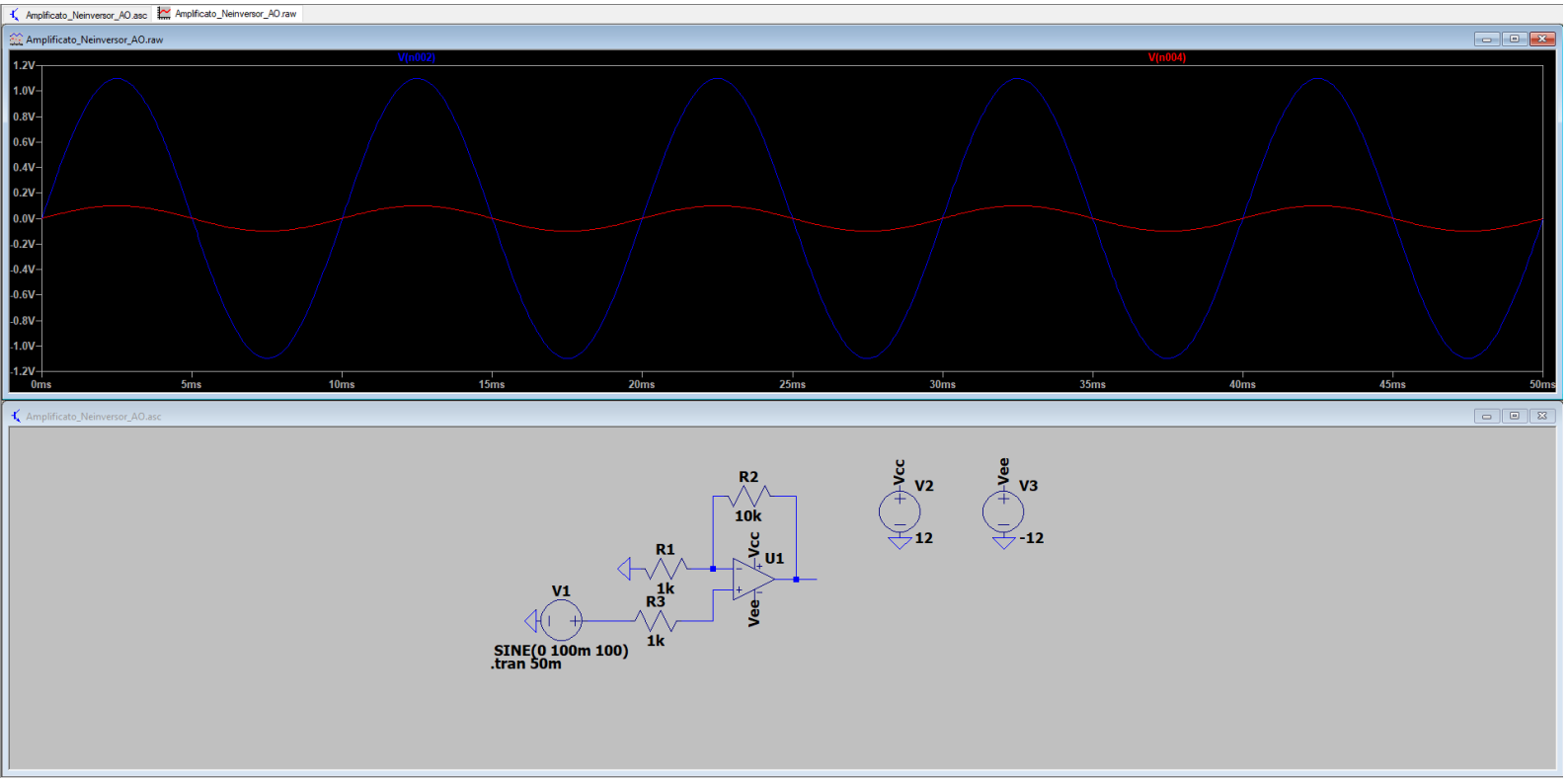
Amplificator neinversor cu AO



Folosim formula:

$$V_{\text{out}} = \left(1 + \frac{\text{R}_\text{f}}{\text{Rg}}\right)\text{V}_\text{in}$$

$R_g = 1K\Omega \qquad R_f = 10k\Omega$

$V_{in} = 100mV$

$=> \ V_{out} = 11 * 100mV = 1100mV = 1.1V$

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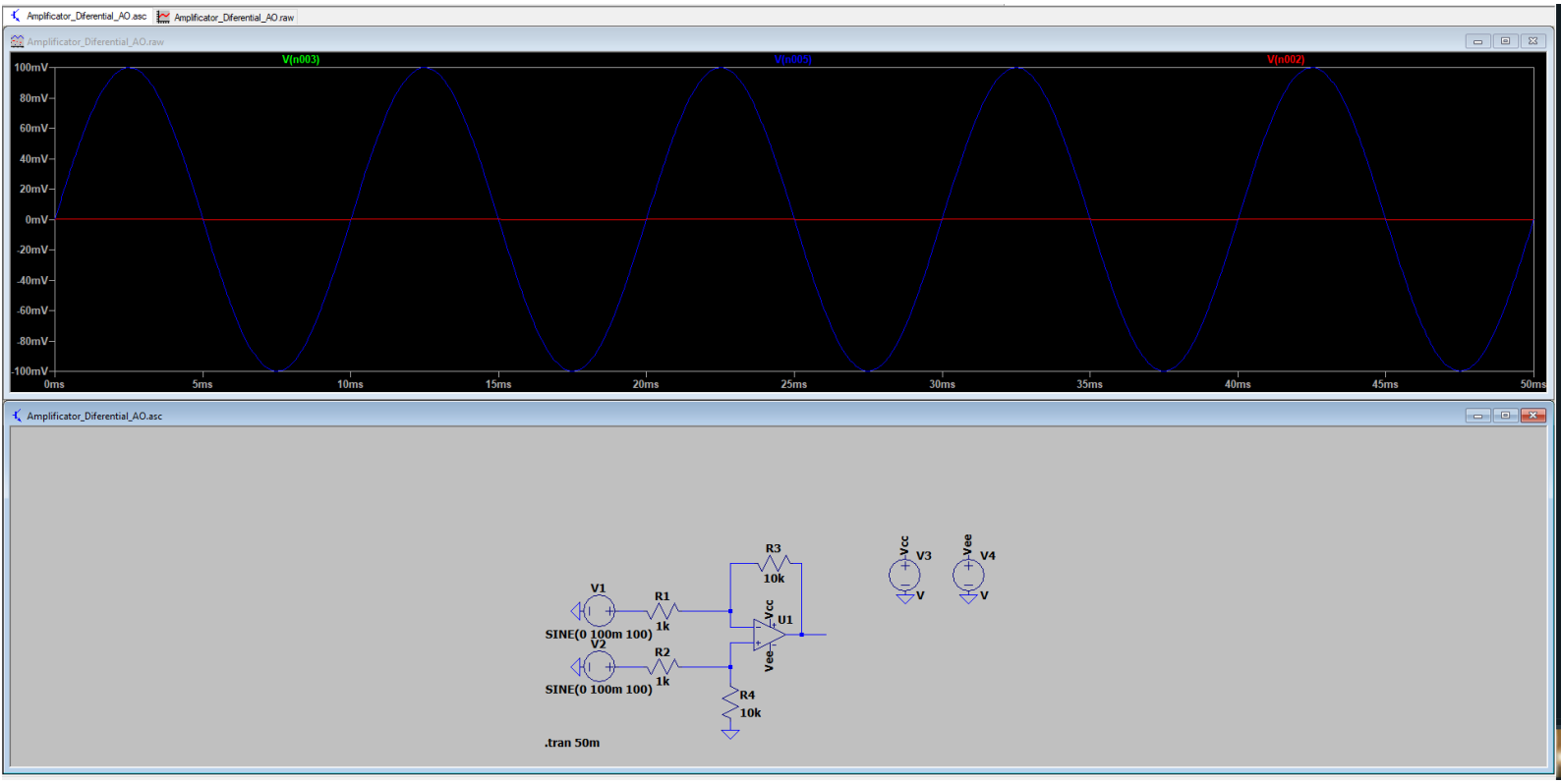
Amplificator diferential cu AO

Caz 1 (ambele tensiuni de intrare sunt egale)



Formula pentru conditia de amplificare diferentiala:

$\left(1+\frac{R_3}{R_1}\right)\frac{R_4}{R_2+R_4}=\frac{R_3}{R_1}$ (sunt putin inversati indicia pentru ca i-am pus altfel in schema)

Formula asta duce la $\frac{R_3}{R_1}=\frac{R_4}{R_2}$ (ceea ce e adevarat pentru rezistentele folosite)

Formula pentru tensiunea de iesire:

$$V_{out}=-\frac{R_3}{R_1}V_{i_1}+\frac{R_2}{R_2+R_4}\left(1+\frac{R_3}{R_1}\right)V_{i_2}$$

$V_{i1}=100mV$

$V_{i2}=100mV$

$R_1=1K\Omega \qquad R_3=10k\Omega \qquad R_2=1K\Omega \qquad R_4=10k\Omega$

$$=>\ V_{out}=-\frac{R_3}{R_1}\left(V_{i_1}-V_{i_2}\right)=\ -10*(100mV-100mV)=\ -10*0=0$$

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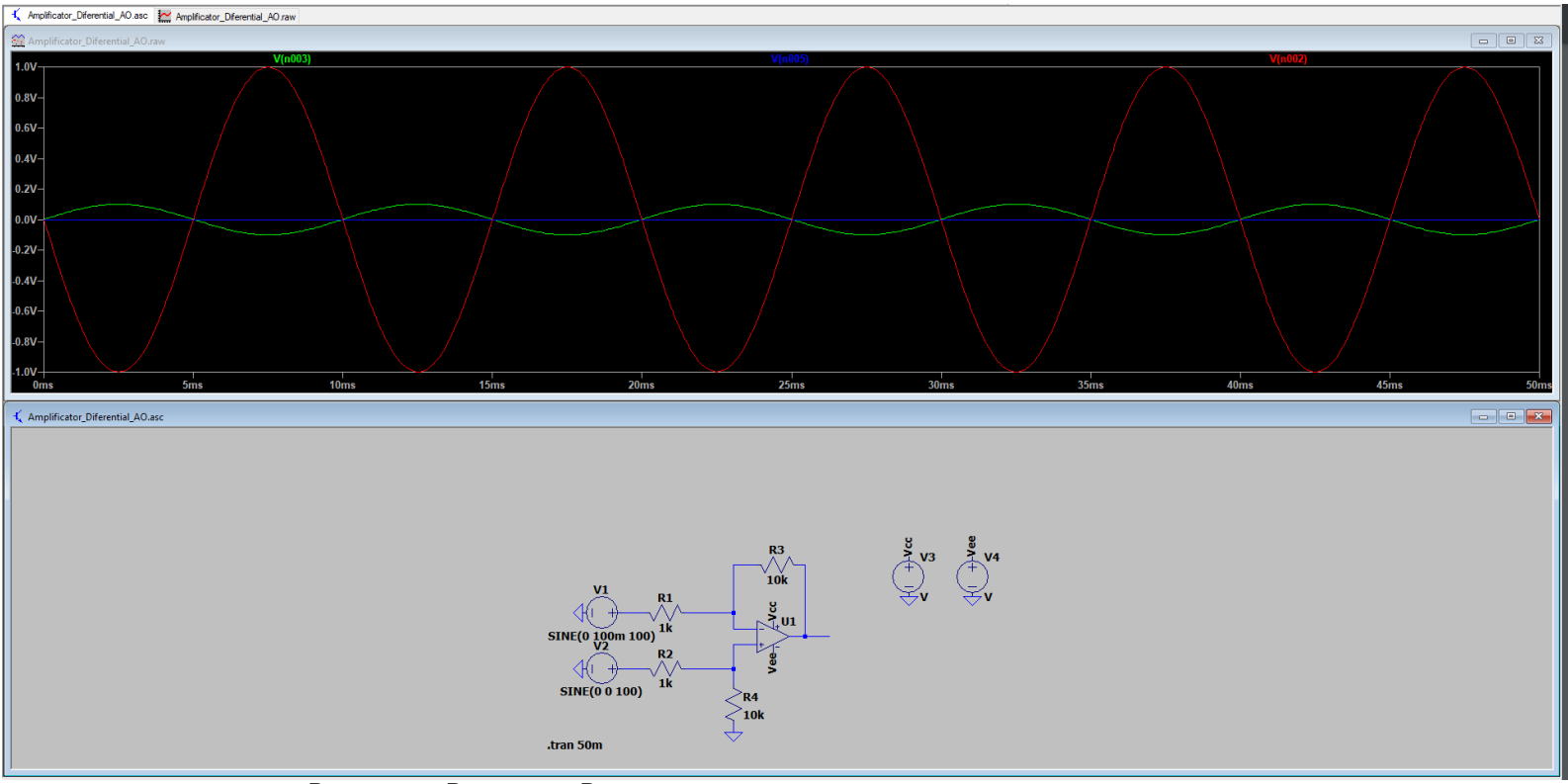
Caz 2 (una din tensiunile de intrare este nula)



$$V_{out} = -\frac{R_3}{R_1}V_{i_1} + \frac{R_2}{R_2 + R_4}\left(1 + \frac{R_3}{R_1}\right)V_{i_2}$$

$V_{i1} = 100mV$

$V_{i2} = 0$

$R_1 = 1K\Omega \qquad R_3 = 10k\Omega \qquad R_2 = 1K\Omega \qquad R_4 = 10k\Omega$

$$=> V_{out} = -\frac{R_3}{R_1}(V_{i_1} - V_{i_2}) = -10 * (100mV - 0) = -10 * 100mV = -1V$$

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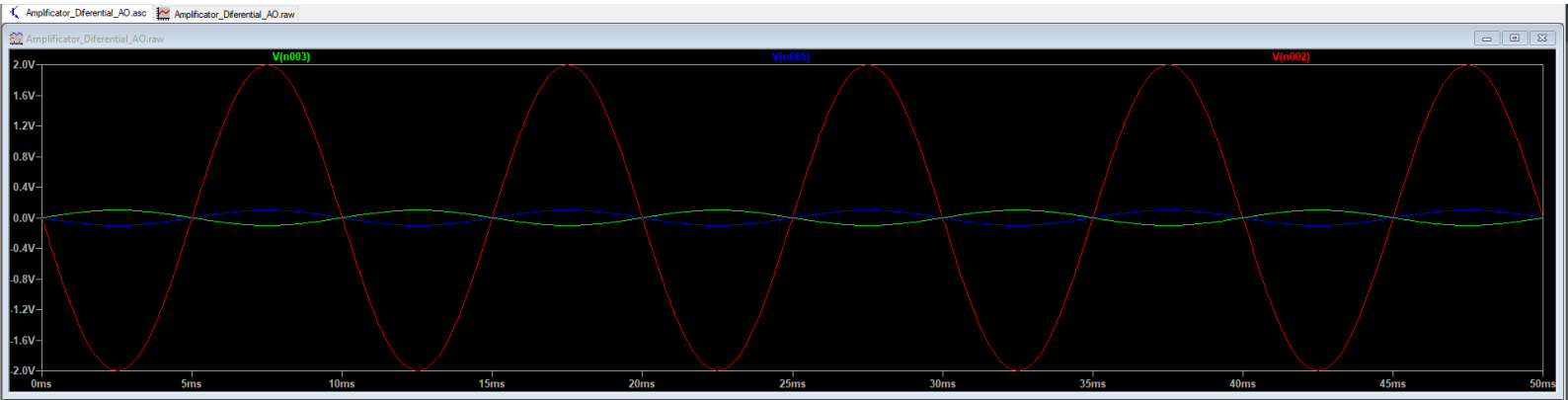
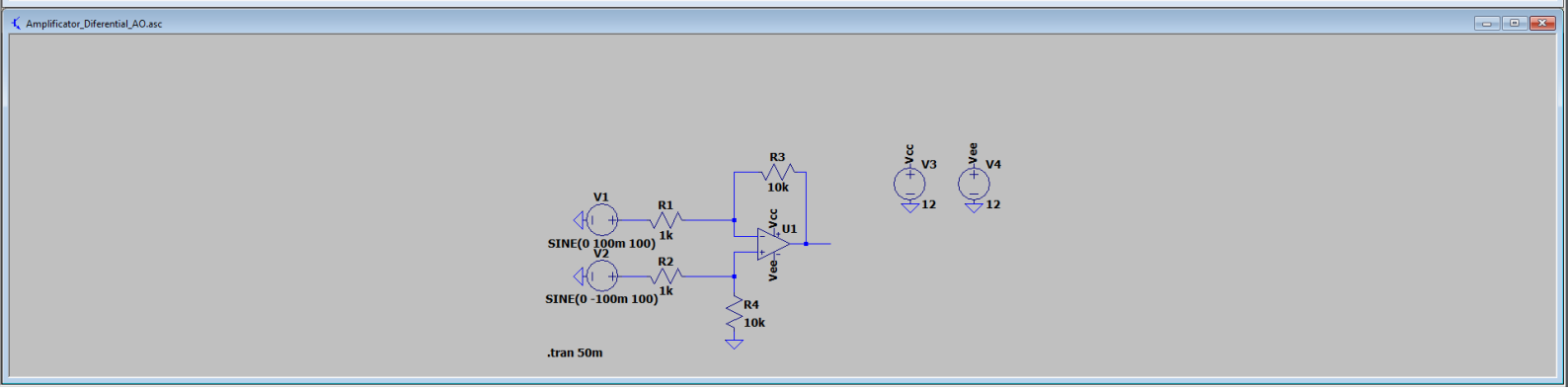
Caz 3 (prima sursa da 100mV si a doua -100mV)





$$V_{out} = -\frac{R_3}{R_1}V_{i_1} + \frac{R_2}{R_2 + R_4}\left(1 + \frac{R_3}{R_1}\right)V_{i_2}$$

$V_{i1} = 100mV$

$V_{i2} = -100mV$

$R_1 = 1K\Omega \qquad R_3 = 10k\Omega \qquad R_2 = 1K\Omega \qquad R_4 = 10k\Omega$

$$=> V_{out} = -\frac{R_3}{R_1}(V_{i_1} - V_{i_2}) = -10 * (100mV - (-100mV) = -10 * 200mV = -2V$$

Tensiunea de iesire se dubleaza fata de cazul anterior