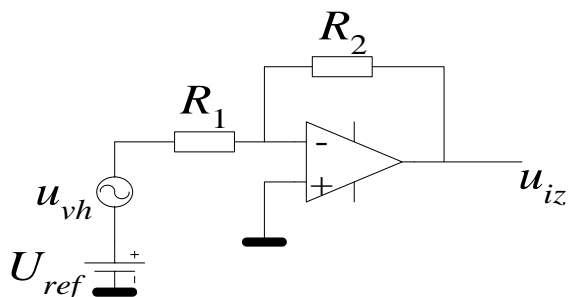


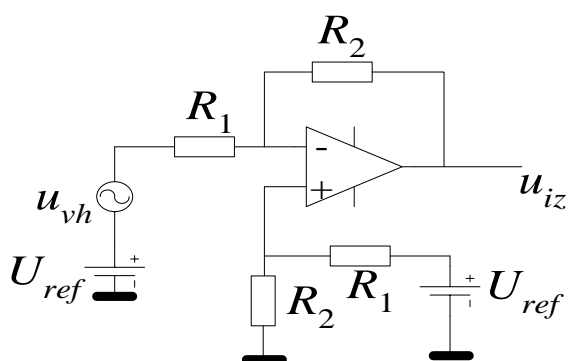
Vezja z operacijskim ojačevalnikom

1. Določi u_{iz} .



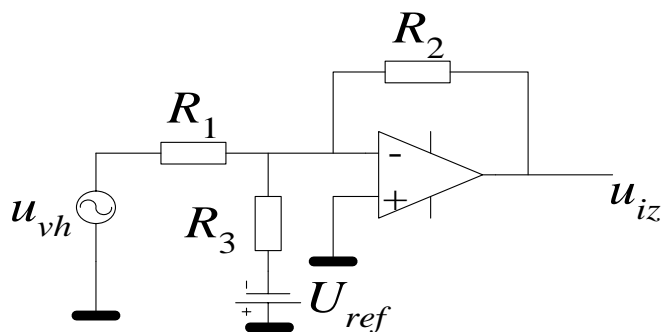
$$u_{iz} = -(u_{vh} + U_{ref}) \frac{R_2}{R_1}$$

2. Določi u_{iz} .

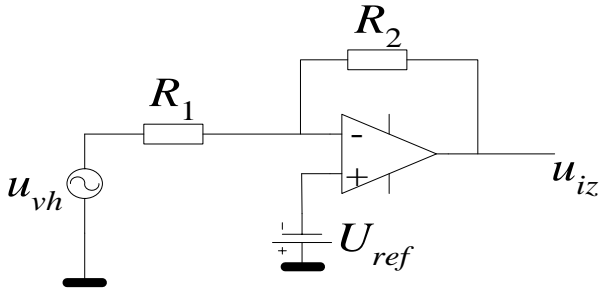


$$u_{iz} = -(u_{vh} + U_{ref}) \frac{R_2}{R_1} + U_{ref} \left(\frac{R_2}{R_1 + R_2} \right) \left(1 + \frac{R_2}{R_1} \right) = -u_{vh} \frac{R_2}{R_1}$$

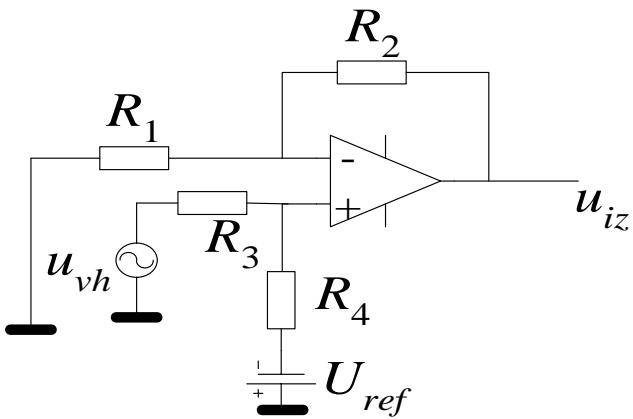
3. Določi u_{iz} .



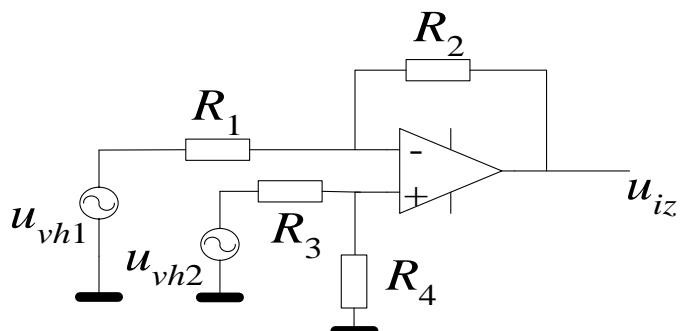
$$u_{iz} = -u_{vh} \frac{R_2}{R_1} + U_{ref} \frac{R_2}{R_3}$$

4. Določí u_{iz} .

$$u_{iz} = -u_{vh} \frac{R_2}{R_1} - U_{ref} \left(1 + \frac{R_2}{R_1}\right)$$

5. Določí u_{iz} .

$$u_{iz} = -u_{vh} \left(\frac{R_4}{R_3 + R_4}\right) \left(1 + \frac{R_2}{R_1}\right) - U_{ref} \left(\frac{R_3}{R_3 + R_4}\right) \left(1 + \frac{R_2}{R_1}\right)$$

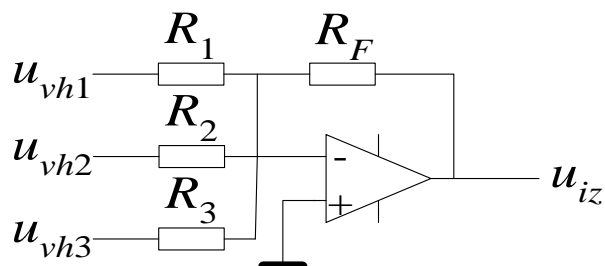
6. Določi u_{iz} .

$$u_{iz} = u_{vh2} \left(\frac{R_4}{R_3 + R_4} \right) \left(1 + \frac{R_2}{R_1} \right) - u_{vh1} \frac{R_2}{R_1}$$

če $R_4 = R_2, R_3 = R_1$

$$u_{iz} = (u_{vh2} - u_{vh1}) \frac{R_2}{R_1}$$

7. Določite funkcijo vezja.



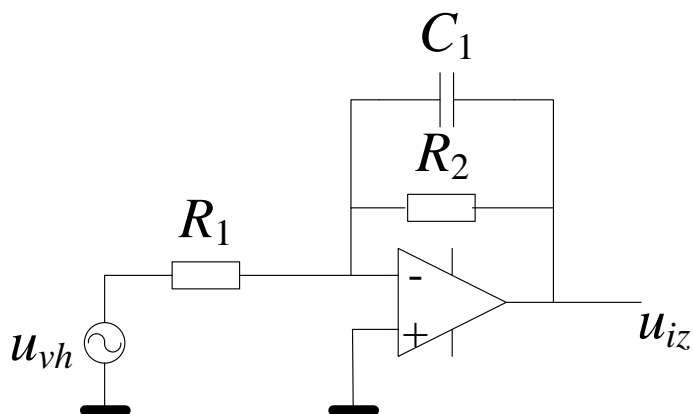
$$u_{iz1} = -u_{vh1} \frac{R_F}{R_1}, \quad u_{iz2} = -u_{vh2} \frac{R_F}{R_2}, \quad u_{iz3} = -u_{vh3} \frac{R_F}{R_3}$$

$$u_{iz} = -\left(u_{vh1} \frac{R_F}{R_1} + u_{vh2} \frac{R_F}{R_2} + u_{vh3} \frac{R_F}{R_3} \right)$$

Vezja z operacijskim ojačevalnikom

8.

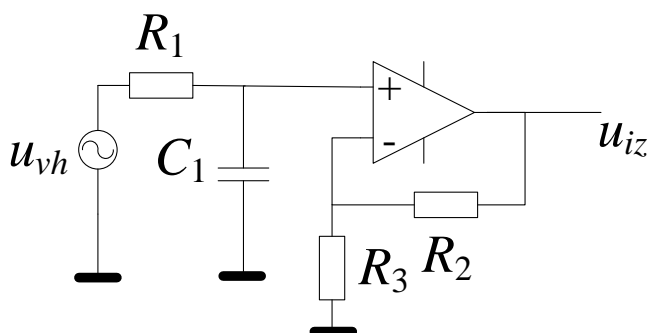
Za invertirajoče nizko sito prvega reda določite izraz za napetostno ojačanje ter skicirajte Bodejev diagram amplitude z označeno mejno frekvenco.



$$\frac{u_{iz}}{u_{vh}} = \frac{-\frac{R_2}{R_1}}{1 + j\omega R_2 C_1}$$

9.

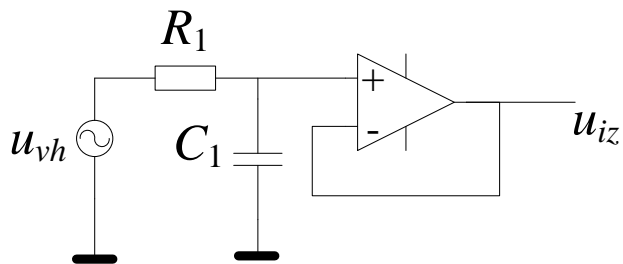
Za neinvertirajoče nizko sito prvega reda določite izraz za napetostno ojačanje ter skicirajte Bodejev diagram amplitude z označeno mejno frekvenco.



$$\frac{u_{iz}}{u_{vh}} = \frac{1 + \frac{R_2}{R_3}}{1 + j\omega R_1 C_1}$$

10.

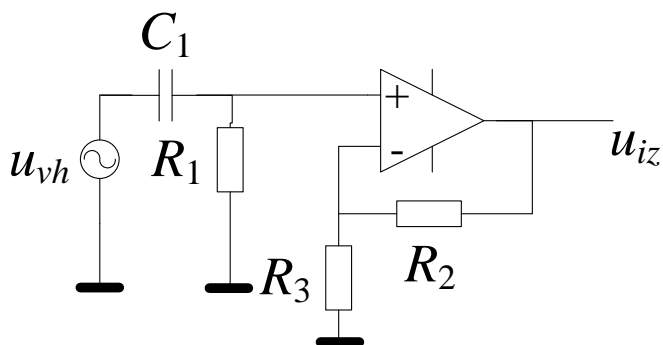
Za nizko sito filter prvega reda na sliki določi R_1 , da bo $f_c = 1$ kHz. $C = 47$ nF.



$$R_1 = \frac{1}{2\pi f_c C_1} = \frac{1}{2\pi \cdot 10^3 \text{ Hz} \cdot 47 \cdot 10^{-9} \text{ F}} = 3.38 \text{ k}\Omega$$

11.

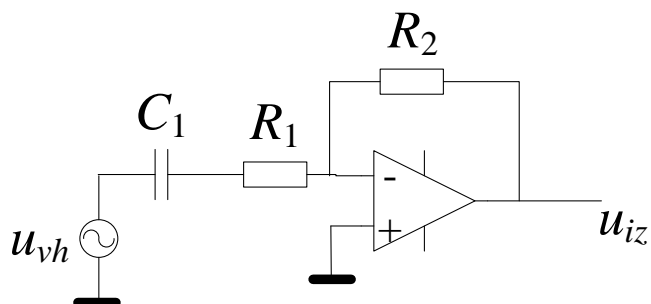
Za neinvertirajoče visoko sito prvega reda določite izraz za napetostno ojačanje ter skicirajte Bodejev diagram amplitude z označeno mejno frekvenco..



$$\frac{u_{iz}}{u_{vh}} = \frac{1 + \frac{R_2}{R_3}}{1 + \frac{1}{j\omega R_1 C_1}}$$

12.

Za invertirajoče nizko sito prvega reda določite izraz za napetostno ojačanje ter skicirajte Bodejev diagram amplitude z označeno mejno frekvenco..



$$\frac{u_{iz}}{u_{vh}} = \frac{\frac{R_2}{R_1}}{1 + \frac{1}{j\omega R_1 C_1}}$$