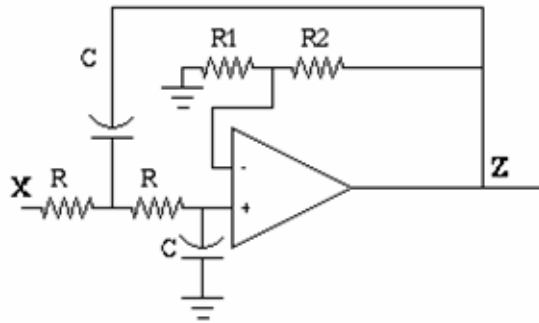


1.) Nariši Bodejev diagram za



$$T(\hat{p}) = \frac{\alpha}{1 + \tau p(3 - \alpha) + \tau^2 p^2}, \quad \alpha = 1 + \frac{R_2}{R_1}$$

$$\alpha = 1 \quad ; \quad T(\hat{p}) = \frac{1}{(1 + \tau p)^2} \rightarrow A(i\omega) = \frac{1}{(1 + i\omega\tau)^2}$$

amplituda

$$20 \log(|A(i\omega)|) = 20 \log\left(\left|\frac{1}{1 + i\omega\tau}\right| \parallel \left|\frac{1}{1 + i\omega\tau}\right|\right) = 40 \log\left(\left|\frac{1}{1 + i\omega\tau}\right|\right) = -40 \log(|1 + i\omega\tau|) = -40 \log(\sqrt{1 + (\omega\tau)^2})$$

faza

$$\varphi_{A(i\omega)} = -\varphi - \varphi = -2\varphi = 2 \arctan(-\omega\tau)$$

Narišimo

$$T(\hat{p}) = \frac{\alpha}{1 + p(3 - \alpha) + \tau^2 p^2}$$

$$\alpha = 2 \quad ; \quad T(\hat{p}) = \frac{2}{1 + p + \tau^2 p^2} \quad ; \text{CC nicli}$$

amplituda

$$20 \log(|A(i\omega)|) = 20 \log 2 + 20 \log\left(\frac{1}{1 + i\omega\tau - \omega^2\tau^2}\right) = -20 \log(\sqrt{(1 - \omega^2\tau^2)^2 + \omega^2\tau^2})$$

$$\text{maksimum: } \frac{d}{d(\omega\tau)} ((1 - \omega^2\tau^2)^2 + \omega^2\tau^2) = 0$$

$$-4\omega\tau + 4\omega^3\tau^3 + 2\omega\tau = 0 \rightarrow \omega\tau = \frac{1}{\sqrt{2}} \rightarrow \omega_{peak} \sim 0.7 / \tau$$

$$|A|_{\max} = -20 \log\left(\frac{\sqrt{3}}{2}\right) = 1.25 + 20 \log 2 = 7.26$$

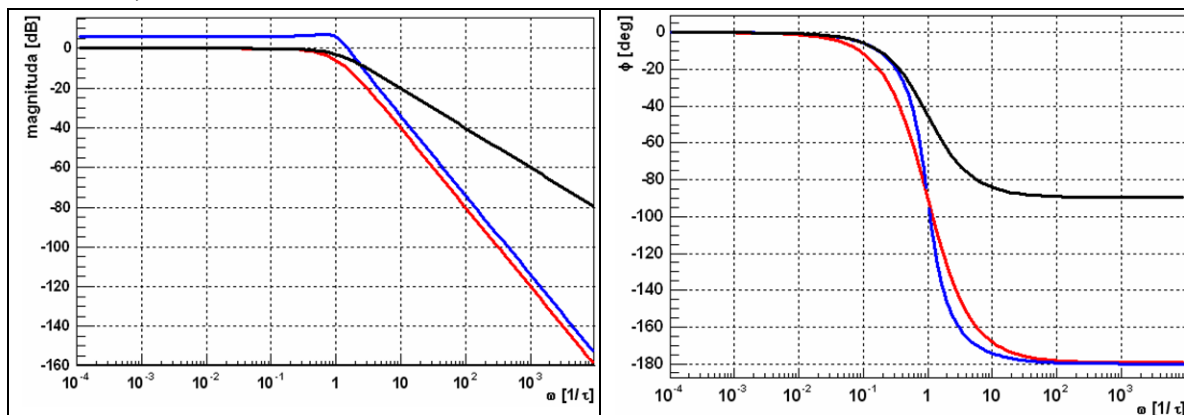
faza

$$\varphi_{A(i\omega)} = \arctan\left(\frac{\omega\tau}{1 - \omega^2\tau^2}\right)$$

$$\omega\tau \rightarrow 0 \quad , \quad 0$$

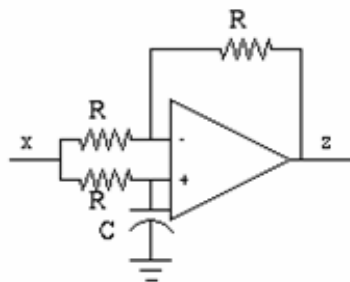
$$\omega\tau \rightarrow \infty \quad , \quad -180$$

$$\omega\tau \rightarrow 1 \quad , \quad -90$$



FILTRI

2.) Kakšen filter je to?



$$\xi = \frac{1}{1+\tau p} x$$

$$\frac{x-\xi}{R} + \frac{z-\xi}{R} = 0$$

$$x+z-2\frac{1}{1+\tau p} x = 0$$

$$z = 2\frac{1}{1+\tau p} x - x = \frac{1-\tau p}{1+\tau p} x$$

$$20 \log(A) = 20 \log(|1-i\omega\tau|) - 20 \log(|1+i\omega\tau|) = 20 \log(\sqrt{1+\omega^2\tau^2}) - 20 \log(\sqrt{1+\omega^2\tau^2}) = 0$$

$$\angle = \arctan(-\omega\tau) + \arctan(-\omega\tau) = -2 \arctan(\omega\tau)$$

To je all pass filter prvega reda. Narišimo. Te filtre uporabljamo za kompenzacijo faze (časovnih zamikov) v različnih vezjih.

3.) Nariši Bodejev diagram za CR, RC in CR-RC filter.