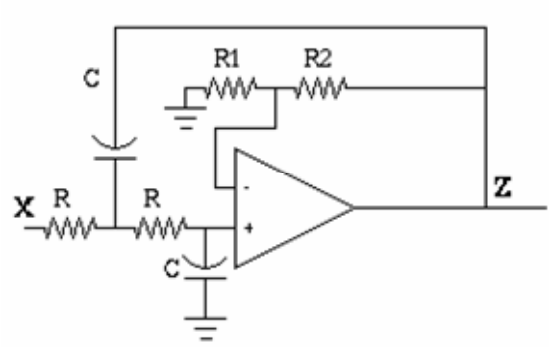
VAJE IZ ELEKTRONIKE (8) **30.11.2005**

Bodejevi diagrami

$\hat{p} = \frac{d}{dt} \rightarrow i\omega \Rightarrow T(\hat{p}) = A(i\omega)$

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

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

faza

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

Narišimo

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

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

amplituda

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

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

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

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

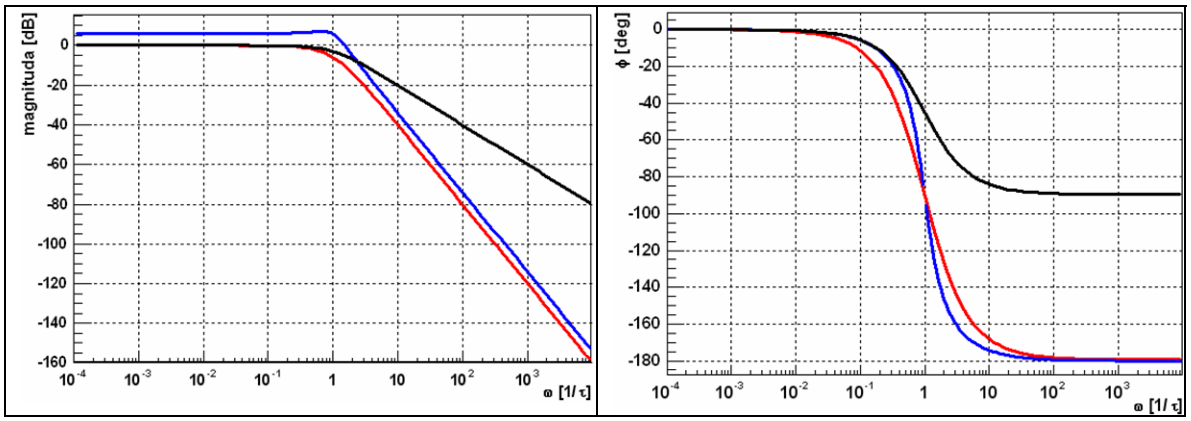
faza

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

$\omega\tau \rightarrow 0$, 0

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

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



2.) Kako izgleda BD za prenosno funkcijo

$$T(\hat{p}) = 10\frac{1-\tau p}{1+2\tau p}$$

amplituda

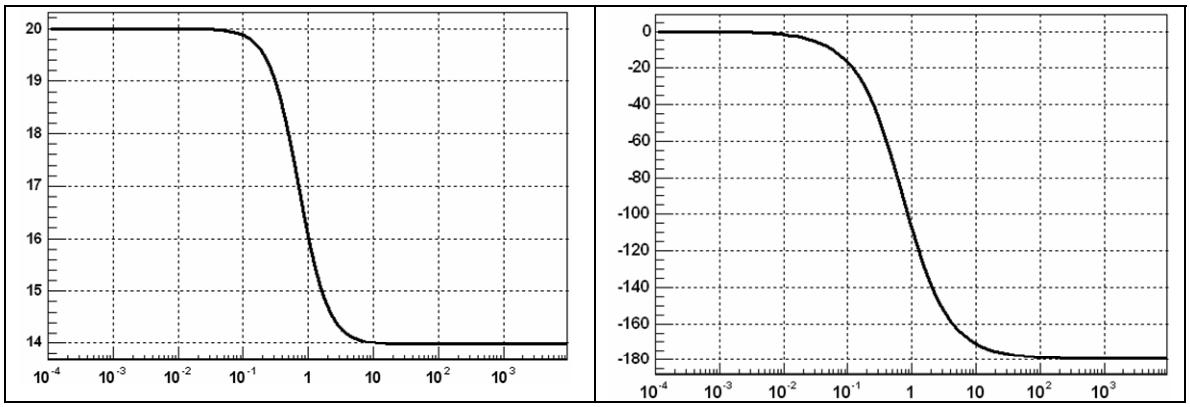
$$20\log(|A(i\omega)|) = 20\log(|10|) + 20\log(|1-i\omega\tau|) + 20\log(|\frac{1}{1+i2\omega\tau}|) = 20 + 20\log(\sqrt{1+(\omega\tau)^2}) - 20\log(\sqrt{1+(2\omega\tau)^2})$$

faza

$\varphi(\omega \rightarrow 0) = 0 + 0 + 0$

$\varphi(\omega \rightarrow \infty) = 0 - 90 - 90 = -180$

$\varphi(\omega \rightarrow 1/\tau) = 0 - 45 - a\tan 2 = \sim 109^0$


20
19
18
17
16
15
14
10^{-4} 10^{-3} 10^{-2} 10^{-1} 1 10 10^{2} 10^{3}
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
10^{-4} 10^{-3} 10^{-2} 10^{-1} 1 10 10^{2} 10^{3}