Systheo 1 GÜ G

21. MAI 2010

$$G(s) = \frac{1}{sT+1} \qquad G(j\omega) = \frac{1}{j\omega T+1}$$

Pol: $s = -\frac{1}{T}$

$$G(j\omega) = \frac{1}{\sqrt{1+(\omega T)^2}\cdot e^{j\arctan(\omega T)}}$$

$$= \frac{1}{\sqrt{1+(\omega T)^2}} \cdot e^{-j\arctan(\omega T)}$$

Amplitudengang: $|G(j\omega)|_{dB} = 20 \cdot \log\left(\frac{1}{\sqrt{1+(\omega T)^2}}\right)$

$$G(s) = sT+1 \qquad G(j\omega) = Tj\omega + 1$$

Nullstelle: $s = -\frac{1}{T}$

$$G(j\omega) = \sqrt{1+(\omega T)^2} \cdot e^{j\arctan(\omega T)}$$

$$|G(j\omega)|_{dB} = 20 \log\left(\sqrt{1+(\omega T)^2}\right)$$

$\omega < \frac{1}{T}$: $|G(j\omega)|_{dB} = 0dB$

$\omega > \frac{1}{T}$: $|G(j\omega)|_{dB} = 20 \log(\omega T)$

$\hat{=}$ Anstieg um 20dB pro Dekade

Nullstelle bei $s = -\frac{1}{10}$

$$|G(j\omega)|_{dB} = 20 \log\left(\sqrt{1+(\omega T)^2}\right)\Big|_{\omega=\frac{1}{T}}$$

$= 20 \log(\sqrt{2}) = \underline{3\,dB}$

Phasengang

$\varphi(j\omega) = \arctan(\omega T)$

$\frac{1}{10T} < \omega < \frac{10}{T}$ Anstieg um 90°

$G(s) = \frac{K}{s} \qquad G(j\omega) = \frac{K}{j\omega}$

Pol: $s = 0$

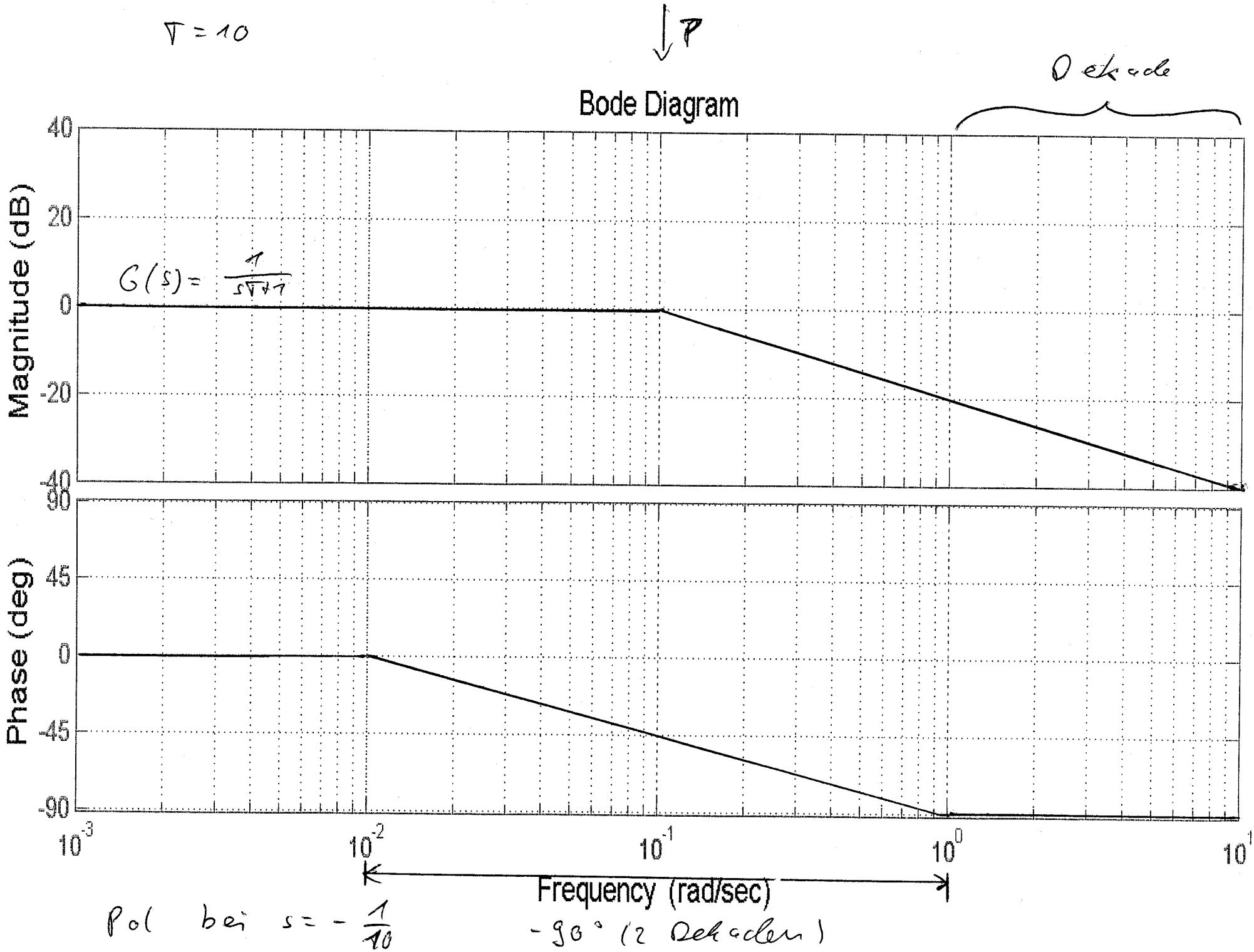
$G(j\omega) = \frac{K}{\omega} \cdot e^{-j90°}$

$|G(j\omega)|_{dB} = 20 \log\left(\frac{K}{\omega}\right) \hat{=} -20\,dB$ pro Dekade

$\sphericalangle G(j\omega) = -90°$

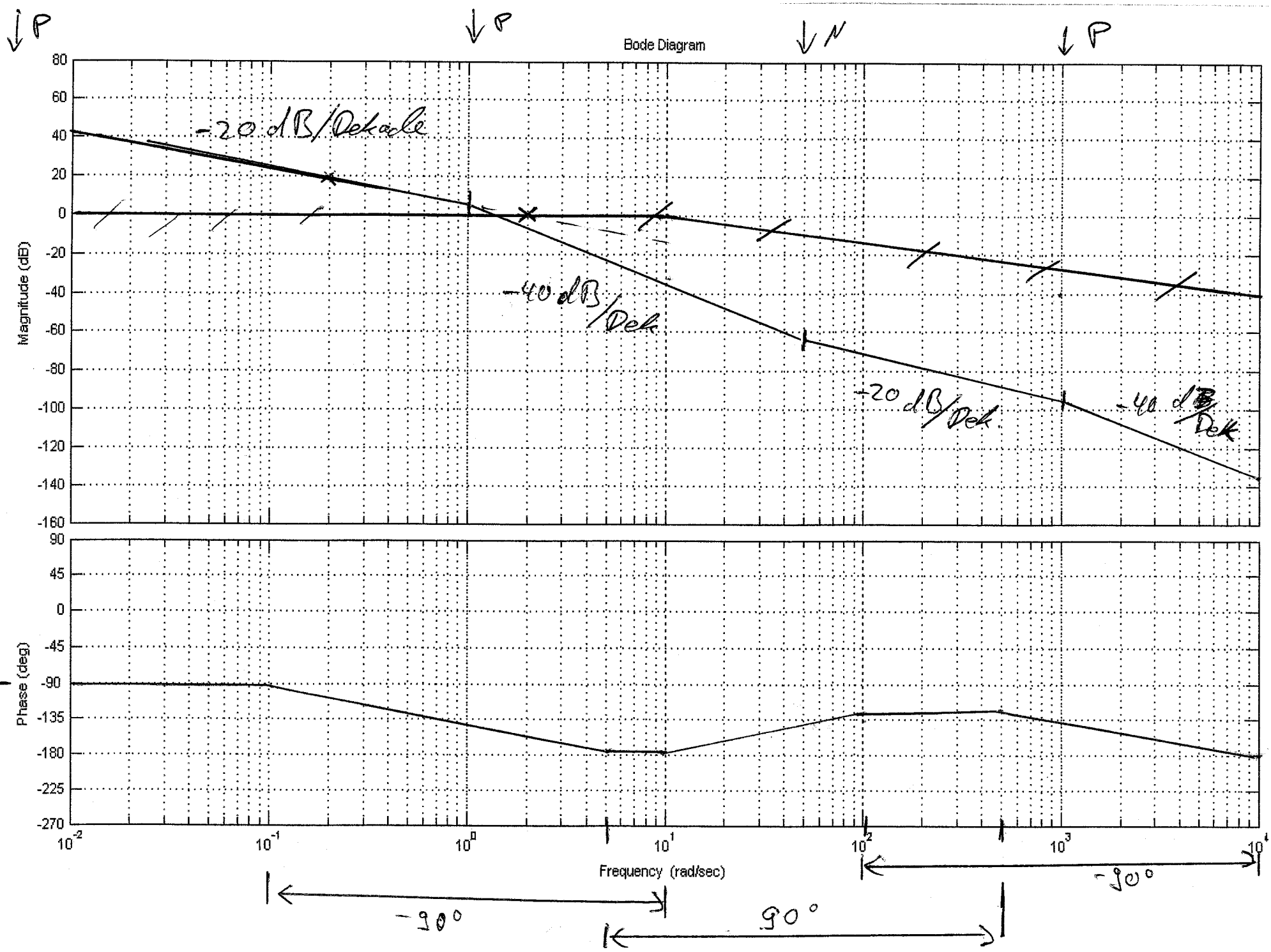
$20 \log\left(\frac{K}{\omega}\right) = 0 \quad \Rightarrow \quad \omega = K$

$T = 10$



Pol bei $s = -\frac{1}{10}$

$-90°$ (2 Dekaden)


P
P
N
P
Bode Diagram
-20 dB/Dekade
-40 dB/Dek
-20 dB/Dek
-40 dB/Dek
Magnitude (dB)
Phase (deg)
Frequency (rad/sec)
-90°
90°
-90°