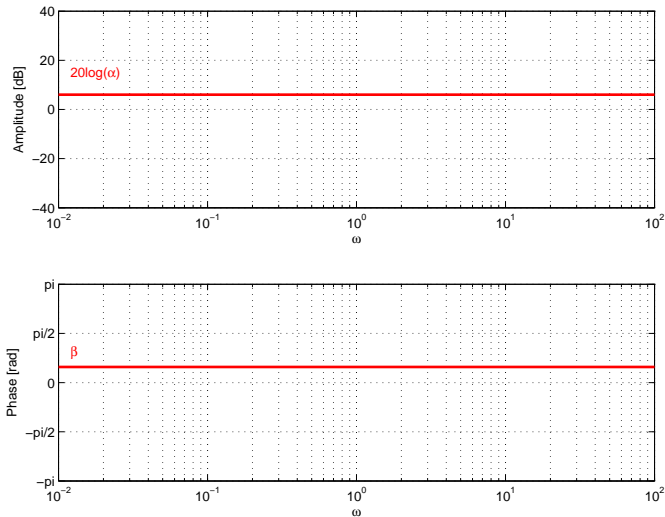


1 Frequenzverhalten von analogen LTI-Systemen

1.1 Approximation von Bode Diagrammen

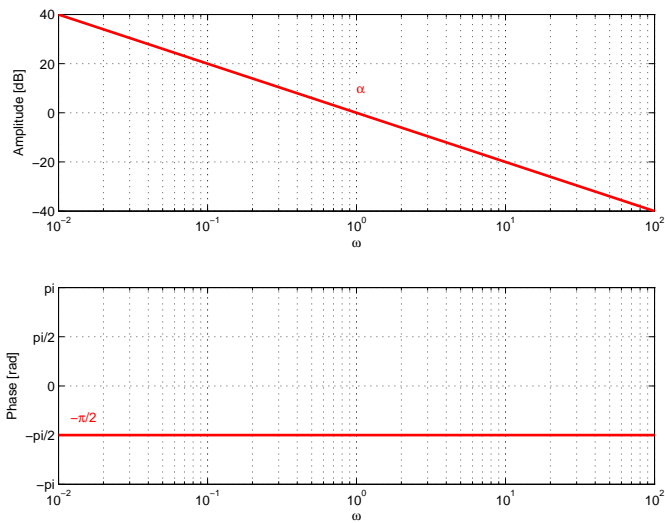
1.1.1 Konstanter Faktor

$$H(s) = \alpha e^{j\beta} \text{ mit } \alpha = 2 \text{ und } \beta = 0.5$$



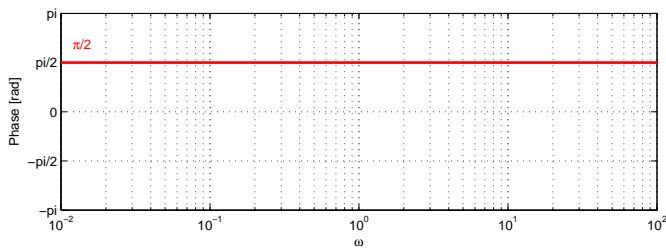
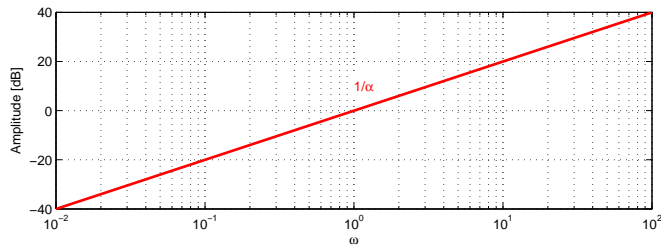
1.1.2 Pol im Ursprung

$$H(s) = \frac{\alpha}{s} \text{ mit } \alpha = 1, \text{ Steilheit } 20\text{dB/Dekade}$$



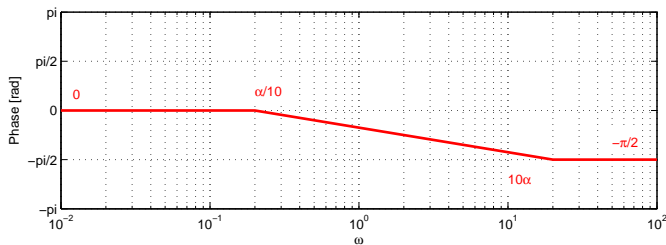
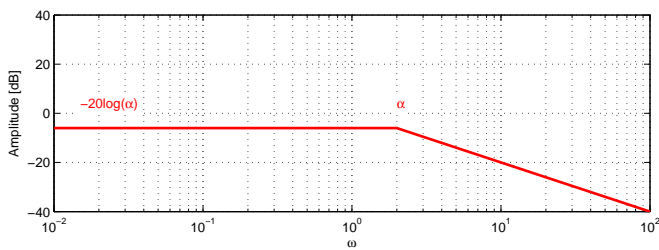
1.1.3 Nullstelle im Ursprung

$H(s) = \alpha s$ mit $\alpha = 1$, Steilheit 20dB/Dekade

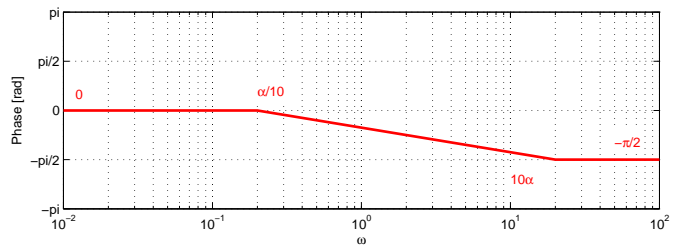
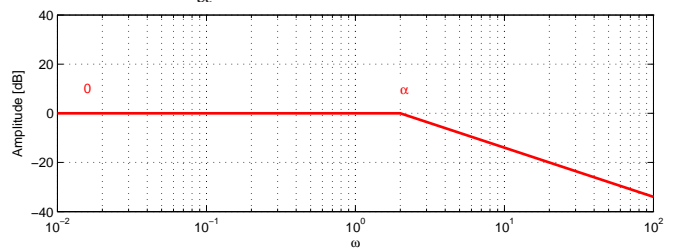


1.1.4 Reeller Pol

$H(s) = \frac{1}{s + \alpha}$ mit $\alpha = 2$, Steilheit 20dB/Dekade

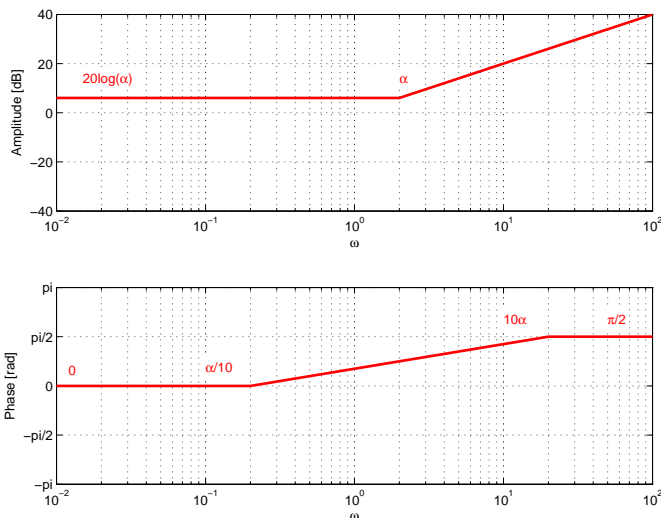


$H(s) = \frac{\alpha}{s + \alpha} = \frac{1}{\frac{s}{\alpha} + 1}$ mit $\alpha = 2$, Steilheit 20dB/Dekade

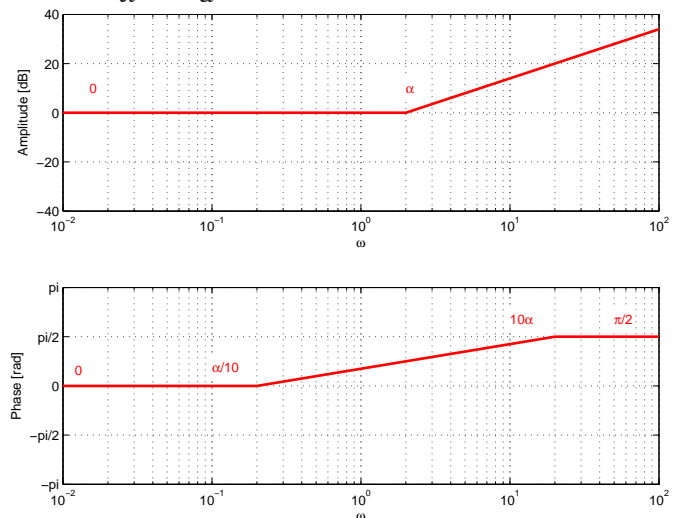


1.1.5 Reelle Nullstelle

$H(s) = s + \alpha$ mit $\alpha = 2$, Steilheit 20dB/Dekade

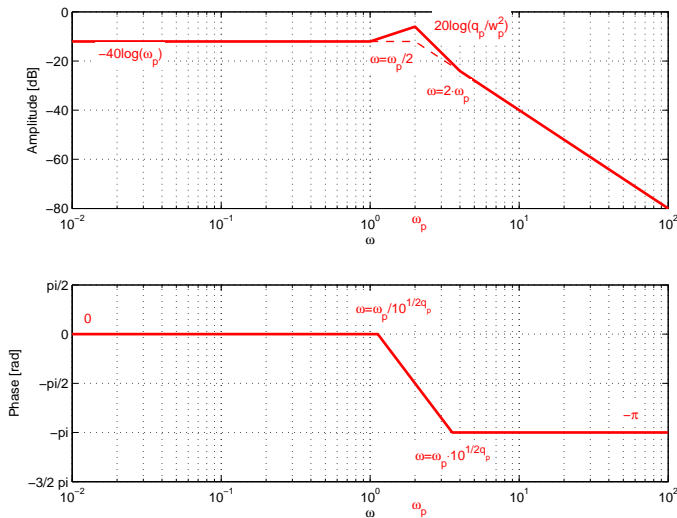


$H(s) = \frac{s + \alpha}{\alpha} = \frac{s}{\alpha} + 1$ mit $\alpha = 2$, Steilheit 20dB/Dekade

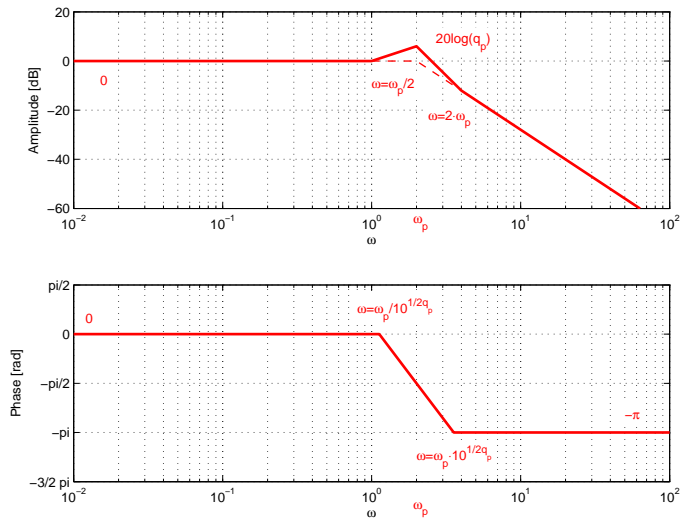


1.1.6 Konjugiert-komplexe Pole

$H(s) = \frac{1}{s^2 + s\frac{\omega_p}{q_p} + \omega_p^2}$ mit $\omega_p = 2$ und $q_p = 2$, Steilheit 40dB/Dekade



$H(s) = \frac{\omega_p^2}{s^2 + s\frac{\omega_p}{q_p} + \omega_p^2}$ mit $\omega_p = 2$ und $q_p = 2$, Steilheit 40dB/Dekade



1.1.7 Konjugiert-komplexe Nullstellen

$H(s) = s^2 + s \frac{\omega_z}{q_z} + \omega_z^2$ mit $\omega_z = 2$ und $q_z = 2$, Steilheit 40dB/Dekade

$H(s) = \frac{s^2 + s \frac{\omega_z}{q_z} + \omega_z^2}{\omega_z^2}$ mit $\omega_z = 2$ und $q_z = 2$, Steilheit 40dB/Dekade

