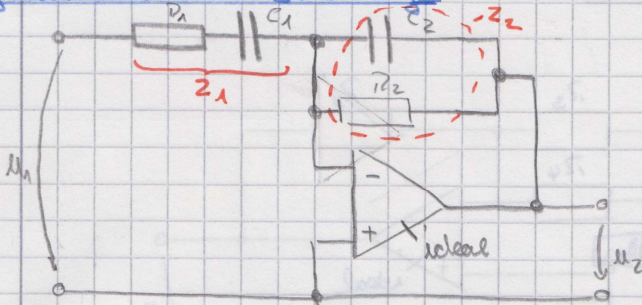


4.04.2011

2-11 Übung zur aktiven RC-Schaltung



$R_1 = 1 \text{ k}\Omega$  ;  $C_1 = 1,53 \mu\text{F}$

$R_2 = 100 \text{ k}\Omega$  ;  $C_2 = 73,6 \text{ pF}$

Gesucht: Übertragungsfkt.  $G_u(s) = \frac{u_2}{u_1}$   
 ableiten (Formel), Grenzfrequenzen, Bodeplot  
 anm!

$$G_u(s) = \frac{-Z_2}{Z_1} = \frac{-1}{Z_1 \cdot R_2} = \frac{-1}{(R_1 + \frac{1}{sC_1})(R_2 + sC_2)}$$

$$= \frac{-sC_1}{(1 + sC_1R_1)(sC_2 + R_2)} \cdot \left(\frac{R_2}{R_2}\right) = \frac{sC_1R_2}{(1 + sC_1R_1)(1 + sR_2C_2)}$$

$$= (-1) \cdot \frac{s}{s_1} \cdot \frac{1}{(1 - \frac{s}{\omega_{p1}})} \cdot \frac{1}{(1 - \frac{s}{\omega_{p2}})}$$

$f \rightarrow 0: \left| \frac{u_2}{u_1} \right| = 0$

$f \rightarrow \infty: \left| \frac{u_2}{u_1} \right| \rightarrow 0$  (Nennertypgrad  $\rightarrow$  Zählergrad)

$s_1 = \frac{1}{R_2C_1} \Rightarrow f_1 = \frac{1}{2\pi R_2C_1} = 1 \text{ Hz}$

$s_{p1} = \frac{-1}{R_1C_1} \Rightarrow f_{p1} = \frac{1}{2\pi R_1C_1} = 100 \text{ kHz}$

$s_{p2} = \frac{-1}{R_2C_2} \Rightarrow f_{p2} = \frac{1}{2\pi R_2C_2} = 201 \text{ kHz}$

$G_u(s) = (-1) \cdot \underline{a_{u0}} \cdot \underline{a_{u1}} \cdot \underline{a_{u2}}$

$a_u(s) = \underline{a_{u0}} + \underline{a_{u1}} + \underline{a_{u2}}$

$\varphi_{d0} = \underbrace{\pm 180^\circ}_{\text{wg(-1)}} + \varphi_{d0} + \varphi_{d1} + \varphi_{d2}$