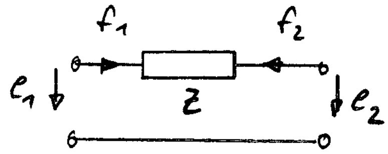
ÜB: $f_2^A = f_1^B$; $e_2^A = e_1^B$

$$\begin{bmatrix} e_1^A \\ f_1^A \end{bmatrix} = A_A A_B \begin{bmatrix} e_2^B \\ f_2^B \end{bmatrix} \quad \curvearrowright \quad \underline{\underline{A = A_A \cdot A_B}}$$

$$\begin{array}{cc} & \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \\ A_A A_B = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} & \begin{bmatrix} a_{11} b_{11} + a_{12} b_{21} & a_{11} b_{12} + a_{12} b_{22} \\ a_{21} b_{11} + a_{22} b_{21} & a_{21} b_{12} + a_{22} b_{22} \end{bmatrix} \end{array}$$

Elementarzweitore

a.)



$$Y_{11} = \left.\frac{f_1}{e_1}\right|_{e_2=0} = \frac{1}{z}$$

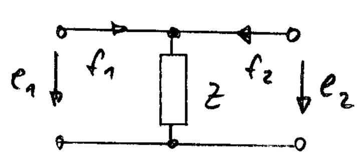
$$Y_{12} = \left.\frac{f_1}{e_2}\right|_{e_1=0} = -\frac{1}{z}$$

(Symetrie) $Y_{11} = Y_{22}$
$Y_{12} = Y_{21}$ $\curvearrowright$ $\underline{\underline{Y = \begin{bmatrix} \frac{1}{z} & -\frac{1}{z} \\ -\frac{1}{z} & \frac{1}{z} \end{bmatrix}}}$

Umrechnungen: Z unbestimmt da $\det Y = 0$?

$A = \begin{bmatrix} 1 & z \\ 0 & 1 \end{bmatrix}$; $H = \begin{bmatrix} z & 1 \\ -1 & 0 \end{bmatrix}$

b.)



$$Z_{11} = \left.\frac{e_1}{f_1}\right|_{f_2=0} = z$$

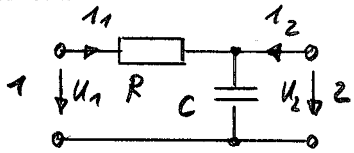
(Symetrie) $Z_{11} = Z_{22}$
$Z_{12} = Z_{21}$

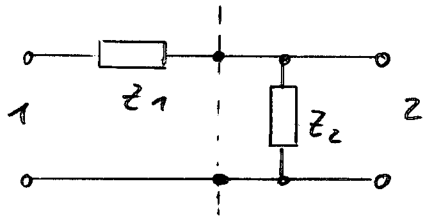
$$Z_{12} = \left.\frac{e_1}{f_2}\right|_{f_1=0} = z$$

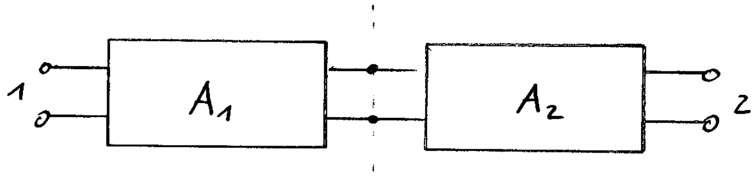
$$Z = \begin{bmatrix} z & z \\ z & z \end{bmatrix}$$

Umrechnungen: $A = \begin{bmatrix} 1 & 0 \\ \frac{1}{z} & 1 \end{bmatrix}$; $H = \begin{bmatrix} 0 & 1 \\ -1 & 1/z \end{bmatrix}$

Bsp.:







$$A = A_1 \cdot A_2$$

$$A_1 = \begin{bmatrix} 1 & Z_1 \\ 0 & 1 \end{bmatrix} \qquad A_2 = \begin{bmatrix} 1 & 0 \\ \frac{1}{Z_2} & 1 \end{bmatrix} \qquad A = \begin{bmatrix} 1\cdot 1 + Z_1 \cdot \frac{1}{Z_2} & 1\cdot 0 + Z_1 \cdot 1 \\ 0 \cdot 1 + 1 \cdot \frac{1}{Z_2} & 0\cdot 0 + 1 \cdot 1 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 + \frac{Z_1}{Z_2} & Z_1 \\ 1/Z_2 & 1 \end{bmatrix} \qquad \begin{bmatrix} u_1 \\ i_1 \end{bmatrix} = A \cdot \begin{bmatrix} u_2 \\ i_2 \end{bmatrix}$$

$$u_1 = A_{11} \cdot u_2 + A_{12} \cdot i_2$$
$$i_1 = A_{21}\, u_2 + A_{22} \cdot i_2$$

Vor: $i_2 = 0$

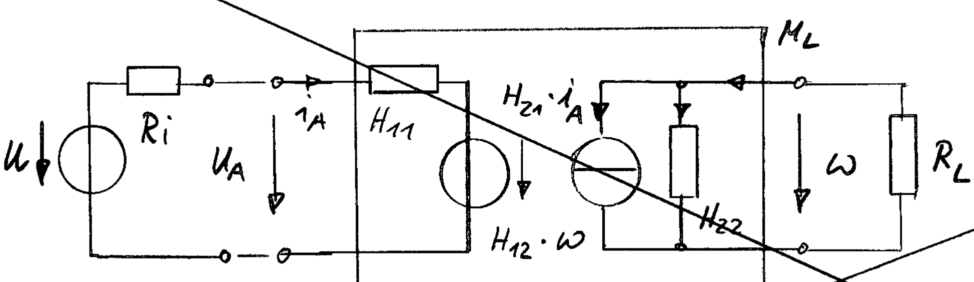
$$u_1 = A_{11} \cdot u_2$$

$$A_{11} = 1 + \frac{R\, j\omega C}{1} = 1 + j\omega RC$$

$$\frac{u_2}{u_1} = \frac{1}{A_{11}} = \frac{1}{1 + j\omega RC}$$

Optimaler Wirkungsgrad von mechan. Wandlern

Bsp.: Gleichstrommotor



(1) $u_A = H_{11} \cdot i_A + H_{12} \cdot \omega$; $M_L = -\frac{\omega}{R_L} = -\omega G_L \quad \leadsto \omega = -M_L \cdot R_L$

pot. Verstärkung: $V_e = \frac{\omega}{u_A}$

$$V_e = \frac{\omega}{H_{11} \cdot i_A + H_{12} \cdot \omega} = \frac{1}{H_{11} \frac{i_A}{\omega} + H_{12}} = \frac{1}{H_{12} - H_{11} \cdot \frac{i_A}{M_L \cdot R_L}}$$