Kettenform eines Pi-Gliedes

$$A = \begin{bmatrix} 1+\frac{Y_3}{Y_2} & \frac{1}{Y_2} \\ Y_1+Y_3+\left(\frac{Y_1 \cdot Y_3}{Y_2}\right) & 1+\frac{Y_1}{Y_2} \end{bmatrix}$$

$$\begin{bmatrix} U_1 \\ I_1 \end{bmatrix} = A \cdot \begin{bmatrix} U_2 \\ -I_2 \end{bmatrix}$$

$$U_1 = A_{11} \cdot U_2 - A_{12} \cdot I_2$$

$$I_2 = 0$$

$$I_1 = A_{21} \cdot U_2 - A_{12} \cdot I_2$$

$$U_1 = A_{11} \cdot U_2$$

$$I_1 = A_{21} \cdot U_2$$

$$Z_E = \frac{U_1}{I_1} = \frac{A_{11} \cdot U_2}{A_{21} \cdot U_2} = \frac{A_{11}}{A_{21}}$$

$$Z_E = \frac{1+\frac{Y_3}{Y_2}}{Y_1+Y_3+\left(\frac{Y_1 \cdot Y_3}{Y_2}\right)}$$

$$Z_E = \frac{Y_2+Y_3}{Y_1 \cdot Y_2 + Y_1 \cdot Y_3 + Y_2 \cdot Y_3}$$

$$Y_1 = \frac{1}{R_1} \qquad Y_2 = \frac{1}{R_2} + C \cdot j\omega \qquad Y_3 = \frac{1}{R_3}$$

$$Z_E = \frac{R_1 \cdot (R_2 + R_3 + C \cdot j\omega \cdot R_2 \cdot R_3)}{R_1 + R_2 + R_3 + C \cdot j\omega \cdot R_1 \cdot R_2 + C \cdot j\omega \cdot R_2 \cdot R_3}$$

$$\lim_{j\omega \to 0} Z_E = \frac{R_1 \cdot (R_2 + R_3)}{R_1 + R_2 + R_3}$$