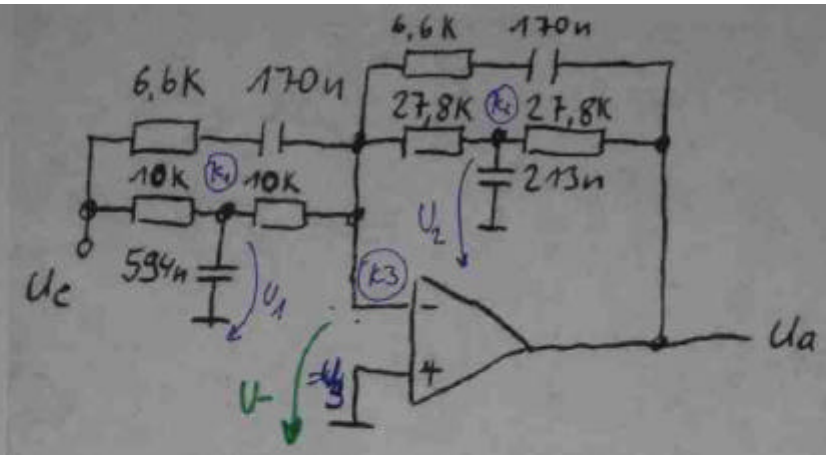

$U_3 = U_- = 0V$ wegen virtueller Masse

Knoten 1 $\quad \frac{U_1 - U_E}{10k} + \frac{U_1 - U_3}{10k} + \frac{U_1}{\cancel{594n}} \; j\omega 594nF = \cancel{0}$ ($U_3 = 0V$)

Knoten 2 $\quad \frac{U_2 - 0V}{27,8k} + \frac{U_2 - U_a}{27,8k} + \frac{U_2}{\cancel{213n}} \; j\omega 213nF = \cancel{0}$

Knoten 3 $\quad \frac{0V - U_1}{10k} + \frac{U_3 - U_E}{10K + \frac{1}{j\omega 170n}} + \frac{U_3 - U_a}{6,6k + \frac{1}{j\omega 170n}} + \frac{U_3 - U_2}{27,8k} = 0$

Ordnen nach U_1 U_2 U_a

$$U_1\left(\frac{1}{10k} + \frac{1}{10k} + j\omega 594nF\right) = \frac{U_E}{10k}$$

$$U_2\left(\frac{1}{27,8k} + \frac{1}{27,8k}\right) + U_2\, j\omega 213nF - \frac{U_a}{27,8k} = \cancel{0}$$

$$U_1\left(-\frac{1}{10k}\right) + U_2\left(-\frac{1}{27,8k}\right) = \frac{U_E}{10k + \frac{1}{j\omega 170n}}$$

$$U_a = \frac{\begin{bmatrix} \left(\frac{1}{10k} + \frac{1}{10k} + j\omega 594nF\right) & 0 & \frac{U_E}{10k} \\ 0 & j\omega 213nF & 0 \\ -\frac{1}{10k} & -\frac{1}{27,8k} & \frac{U_E}{10k + \frac{1}{j\omega 170nF}} \end{bmatrix}}{\begin{bmatrix} \left(\frac{1}{10k} + \frac{1}{10k} + j\omega 594nF\right) & 0 & 0 \\ 0 & j\omega 213nF & -\frac{1}{27,8k} \\ -\frac{1}{10k} & -\frac{1}{27,8k} & 0 \end{bmatrix}}$$

$$U_a = \frac{\frac{U_E}{10k} \frac{j\omega 213nF}{10k} + \frac{U_E}{10k + \frac{1}{j\omega 170n}} \left(\frac{1}{10k} + \frac{1}{10k} + j\omega 594nF\right) j\omega 213nF}{\frac{1}{27,8k}\left(\frac{1}{10k} + \frac{1}{10k} + j\omega 594nF\right)\left(-\frac{1}{27,8k}\right)}$$