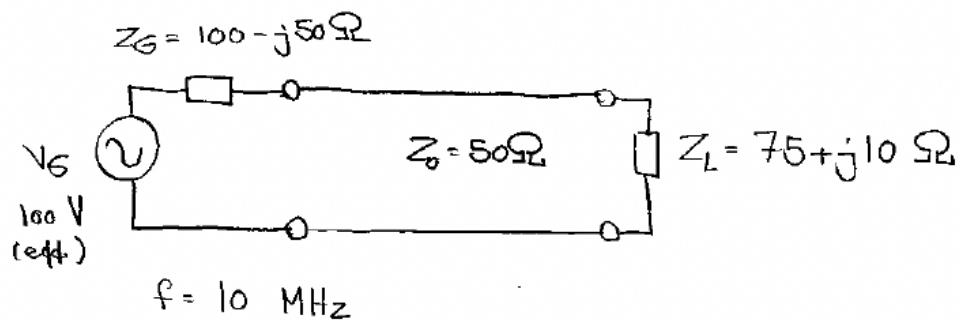


## 10.1



a) Beregning af  $K_L$ .

$$\begin{aligned}
 K_L &= \frac{Z_L - Z_0}{Z_L + Z_0} = \frac{75 + j10 - 50}{75 + j10 + 50} = \frac{25 + j10}{125 + j10} \\
 &= 0,205 + j0,064 = 0,215 \angle 17,2^\circ
 \end{aligned}$$

b) Beregning af  $K(x)$

$$K(x) = K_L \cdot e^{-j3\pi} \quad (\text{dus vi har } \beta \cdot l = 1,5\pi \text{ da } K(x) \text{ er } K_L \cdot e^{-j2\beta l})$$

$$\begin{aligned}
 K(x) &= 0,215 \angle 17,2^\circ \cdot \exp(-j3\pi) \\
 &= -0,205 - j0,064 = 0,215 \angle -162,8^\circ
 \end{aligned}$$

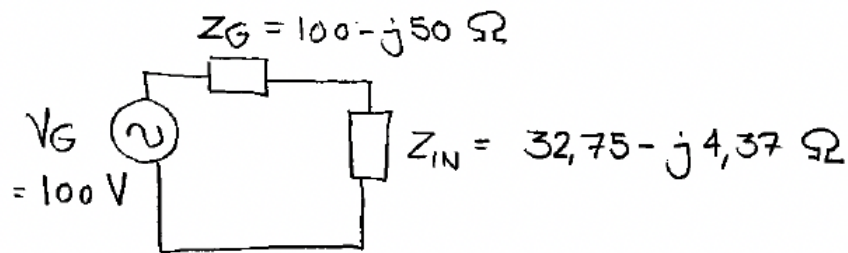
c) Beregning af  $Z_{IN}$

$$\begin{aligned}
 Z_{IN} = Z(x) &= Z_0 \cdot \frac{1 + K(x)}{1 - K(x)} \\
 &= 50 \cdot \frac{1 + 0,215 \angle -162,8^\circ}{1 - 0,215 \angle -162,8^\circ}
 \end{aligned}$$

$$Z_{IN} = 50 \cdot \frac{1 + 0,215 \angle -162,8}{1 - 0,215 \angle -162,8}$$

$$= 32,751 - j4,367 \quad (= 33,04 \angle -7,6^\circ)$$

d) Spændingen på indgangen.



$$V_{IN} = V_G \cdot \frac{Z_{IN}}{Z_{IN} + Z_G} = 100 \cdot \frac{32,7 - j4,4}{32,7 - j4,4 + 100 - j50}$$

$$= 23,033 \angle 14,7^\circ \text{ V (effektiv)}$$

$$(= 22,281 + j5,836)$$

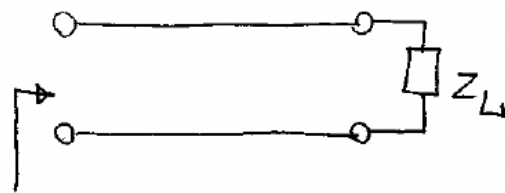
e) Strømmen i indgangen beregnes.

$$I_{IN} = \frac{V_G}{Z_G + Z_{IN}} = \frac{V_{IN}}{Z_{IN}} = \frac{23,03 \angle 14,7^\circ}{33,04 \angle -7,6^\circ}$$

$$= 0,697 \angle 22,3^\circ \text{ A (effektiv)}$$

$$(= 645 + j264 \text{ mA})$$

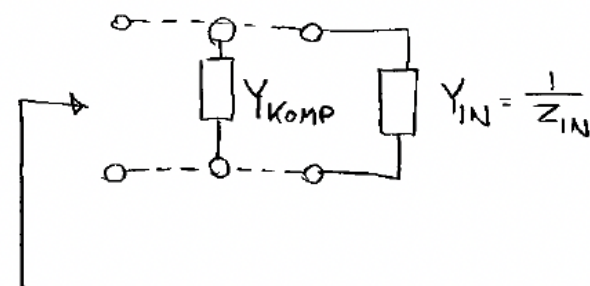
f)



$$Z_{IN} = 32,75 - j4,37 \, \Omega$$

Det ses, at indgangen er kapacitiv, hvorfor der skal en spole til at ophæve dette. Spoler og kondensatorer har modsat fortegn.

Da komponenterne skal sidde i parallel, anvender vi regning i admittansen.



$$Y_{NY} = Y_{komp} + Y_{IN} \text{ skal være reel.}$$

$$Y_{IN} = \frac{1}{Z_{IN}} = \frac{1}{32,75 - j4,37} = 30,0 + j4,003 \, \text{mS}$$

$Y_{komp}$  skal dermed være på  $-j4,003 \, \text{mS}$

$$B_L = \frac{1}{\omega L} \Rightarrow L = \frac{1}{\omega B_L}$$

$$L = \frac{1}{2\pi \cdot 10^6 \cdot 4,003 \cdot 10^{-3}} = 3,98 \, \mu\text{H}$$