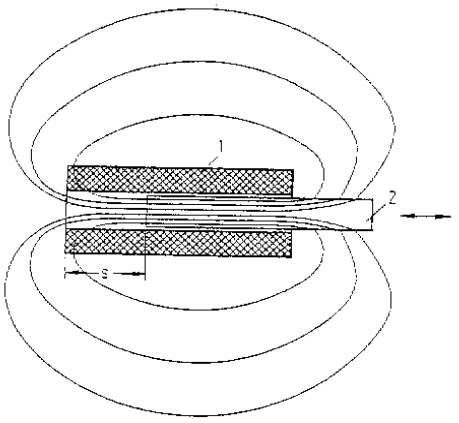
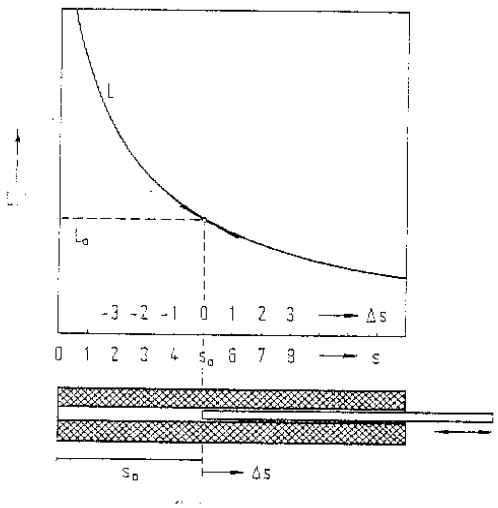
8. Messsysteme mit L- und C-Sensoren

8.1 Sensoren

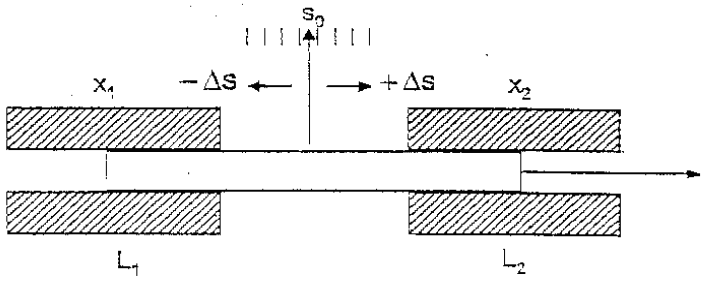
a) induktive Sensoren

- **Tauchanker-Aufnehmer** (Einzel-Sensor)





- **Differential-Tauchanker-Aufnehmer** (Doppel-Sensor)



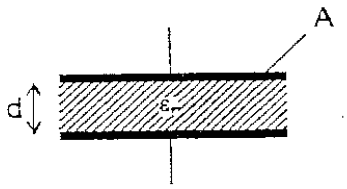
- 2 getrennte Spulen
- 1 Eisenkern

$$\Rightarrow \quad \begin{cases} L_1 = \dfrac{k}{s_1} = \dfrac{k}{s_0 + \Delta s} \\ L_2 = \dfrac{k}{s_2} = \dfrac{k}{s_0 - \Delta s} \end{cases}$$

Mittelstellung: s_0

b) kapazitive Sensoren

- **Plattenkondensator** (Einzel-Sensor)

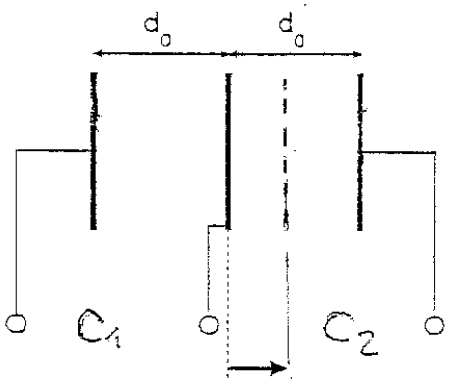


$$C = \frac{\varepsilon_0 \varepsilon_r A}{d}$$

Variation des Plattenabstandes:

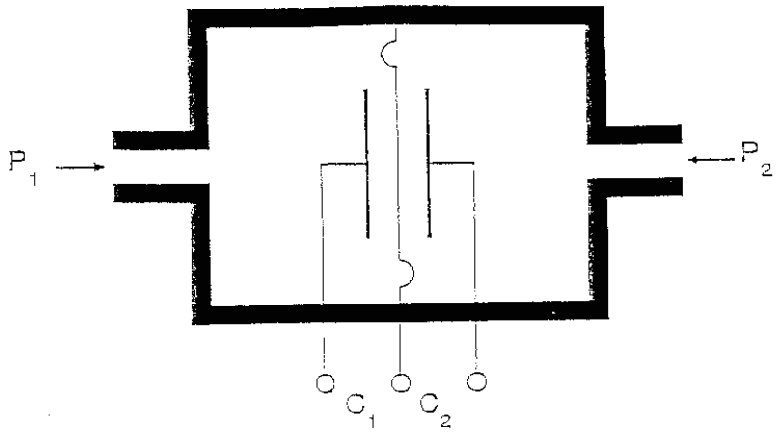
$$E = \frac{dC}{dd} = -\frac{\varepsilon_0 \varepsilon_r A}{d^2} = -\frac{C}{d}$$

- **Differential- Plattenkondensator** (Doppel-Sensor)



Anwendung:

Weg-Messung
Winkel-Messung
Kondensatormikrophon

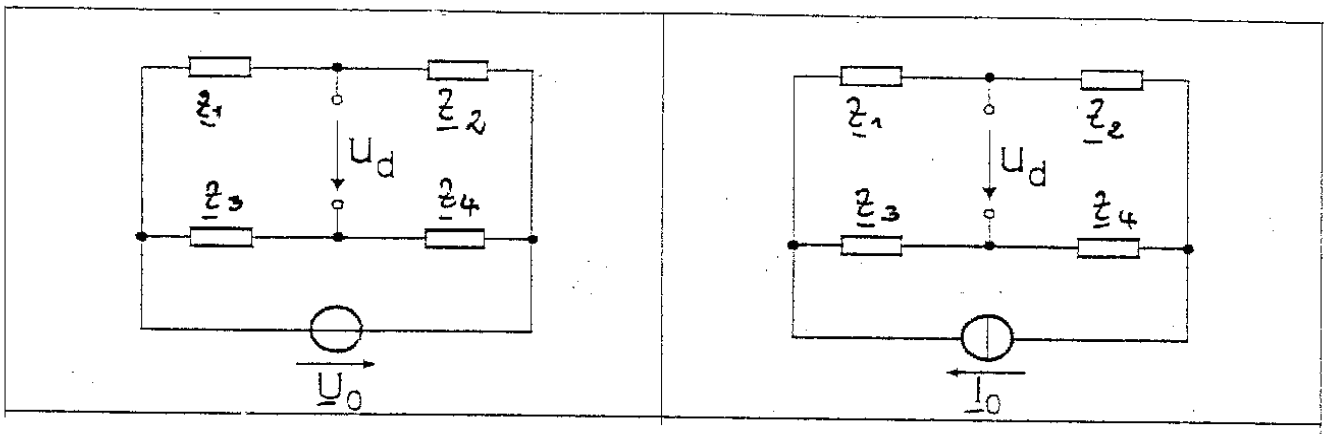


8.2 Messung komplexer Widerstände

a) digitale Messmethoden

Schwingkreis --> Frequenz-, Periodendauermessung
RC-Messungen mit Relaxartionsoszillatoren, DualSlope-Methoden
Korrelative Messungen

b) Wechselstrom-/Wechselspannungsbrücken



unbelastet:

$$\underline{U}_d = \underline{U}_0 \frac{\underline{Z}_2\underline{Z}_3 - \underline{Z}_1\underline{Z}_4}{(\underline{Z}_1+\underline{Z}_2)(\underline{Z}_3+\underline{Z}_4)}$$

unbelastet:

$$\underline{U}_d = \underline{I}_0 \frac{\underline{Z}_2\underline{Z}_3 - \underline{Z}_1\underline{Z}_4}{\underline{Z}_1+\underline{Z}_2+\underline{Z}_3+\underline{Z}_4}$$