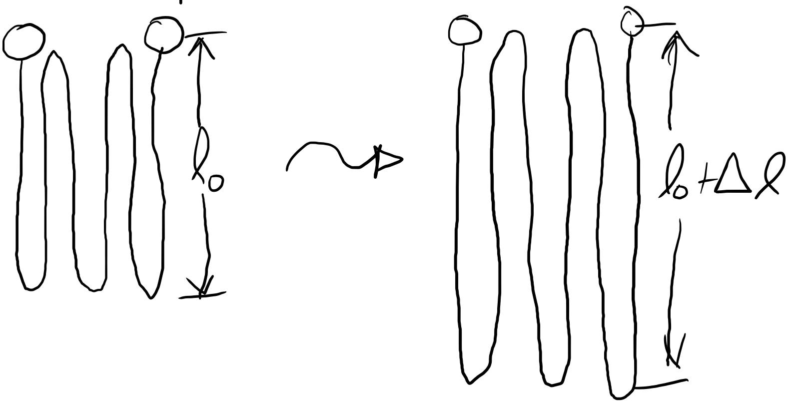
Today:
- Bridge Amplifier circuit for loadcells.
  (Load cell).
  → "Instrumentation amplifier"

- Considerations for measuring junction resistance.
  - Use Tabor! to estimate $R_{junction}$.
  - Feasible plan for measurement: Current source + Amp.
- Low-level measurements handbook. (Keithley)
  ch. 3 low-R measurements.
- compare measurement w/ Hz theory.

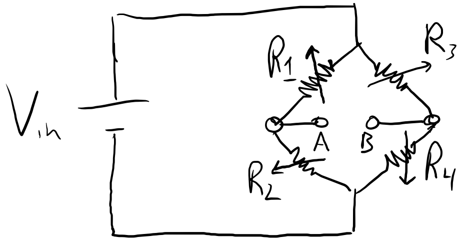
Strain gages & load cells: LC's typ. consist of 4 resistors:
(strain gages):

Strain gages: precision resistors made of thin metallic film:



Increasing the length increases it's resistance.

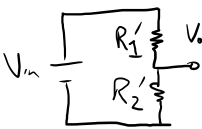
Wheatstone Bridge:



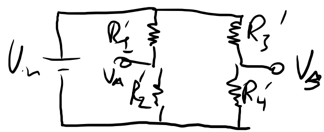
Thermal effects on R are automatically compensated.

Typ. $R_1 = R_2 = R_3 = R_4$ when unloaded.

When unloaded: $V_A = V_B = V_{in}/2$. (hence inst. Amp).



$V_{out} = \frac{R_2'}{R_1'+R_2'}$.



$V_A = \frac{R_2'}{R_1'+R_2'} \cdot V_{in}$ & $V_B = \frac{R_4'}{R_3'+R_4'} \cdot V_{in}$ (untouched all R's same $\Rightarrow V_A = V_B$)

The bridge is laid out so that

R_1' & R_2' ; R_3' & R_4' are loaded <u>opposite</u>.

R_1' in tension ⟹ R_2' in compression ⟹ R_2' & R_3' ; R_1' & R_4' are opposite aswell.

Start building instrumentation amp to amplify load cell. (INA ...)
- Build current source & calibrate it (Ref 102 & datasheet)
- V amp & calibrate that.
  After estimation!

- Beware thermoelectric potential.

Tuesdays (next Tues) we're open 16 - 19..