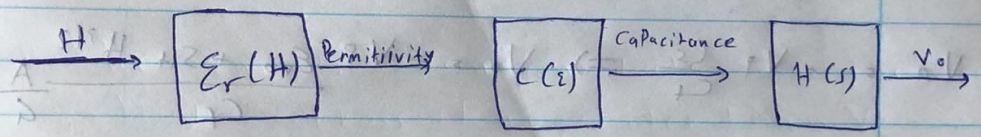
* Capacitive Measurement system homework
* Fahy Froukh 217 11266

a) Draw a block diagram of the capacitive measurment system showing how the physical values flows in the system and the relationships between them

* Solution:



b) Determine the relationship between the sensor capacity Cs and the relative humidity H

* Solution:

$$C_s = \varepsilon_r \varepsilon_0 \frac{A}{d} = (\varepsilon_{r0} + S_H \cdot H^{3/2}) \varepsilon_0 \frac{A}{d}$$

~~c) Determine the relationship between the sensor capacity~~

c) Determine the relationship b/w the output voltage V_o and the relative humidity

* Solution:

$$V_o = -V_i \frac{\frac{-1}{j\omega C_f}}{\frac{-1}{j\omega C_s}} = -V_i \frac{j\omega C_s}{j\omega C_f}$$

$$\Rightarrow V_o = -V_i \frac{C_s}{C_f} \Rightarrow V_o = -V_i \frac{\varepsilon_{ro} + S_H H^{3/2}}{C_f} \frac{A}{G} \varepsilon_o$$