Exam from Sept. 2013

T2 g) From f) we know

$$v_{max} = 329.7 \frac{m}{sec}$$

$$\Delta t = \frac{\Delta x}{v_{max}} = \frac{0.1\,m}{329.7 \frac{m}{sec}}$$

$$\approx 0.000303\,sec$$

$$f_0 = \frac{1}{\Delta t} \approx 3297.1\,Hz$$

Exam from March 2013 – Task 2

a) $\Delta R = f(T)$

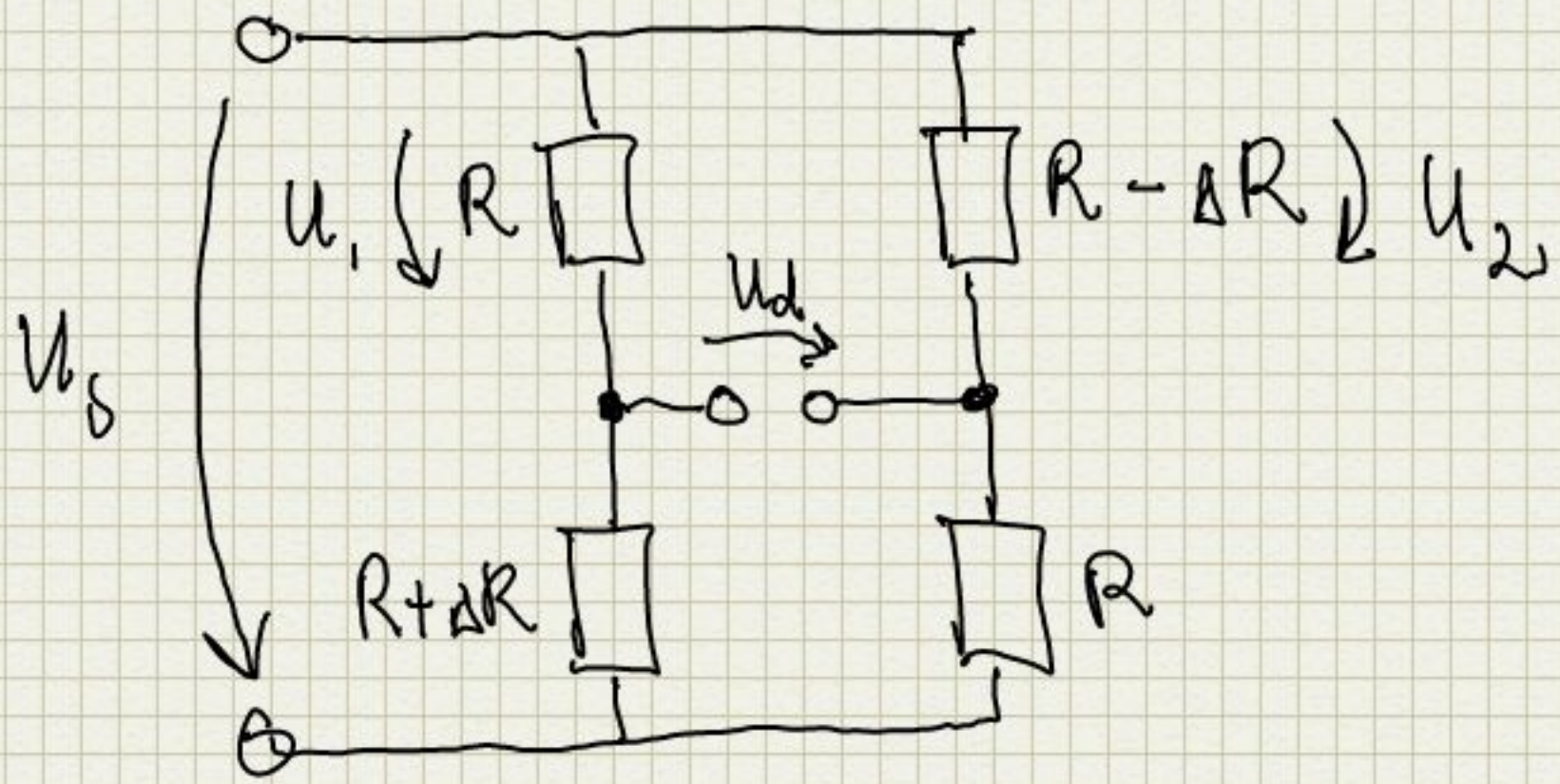
$$\Delta R = R_0 K \frac{y}{|\rho|} \Rightarrow \Delta R = RK \frac{y}{EI} |T|$$

Upper strain gauge: $\Delta R_u = \frac{RK|T|}{EI} \frac{h}{2}$

Lower " " : $\Delta R_L = \frac{RK|T|}{EI} \cdot \left(-\frac{h}{2}\right)$

$$\Delta R_u = -\Delta R_L$$

b)



$$U_1 + U_d - U_2 = 0 \Leftrightarrow U_d = U_2 - U_1$$

$$U_d = \frac{R-\Delta R}{2R-\Delta R} U_S - \frac{R}{2R+\Delta R} U_S$$

$$= \frac{(R-\Delta R)(2R+\Delta R) - R(2R-\Delta R)}{4R^2-\Delta R^2} U_S$$

$$= U_S \cdot \frac{2R^2 + R\Delta R - 2R\Delta R - \Delta R^2 - 2R^2 + R\Delta R}{4R^2-\Delta R^2} \quad (= -R\Delta R)$$

$$= \frac{-\Delta R^2}{4R^2-\Delta R^2} U_S$$