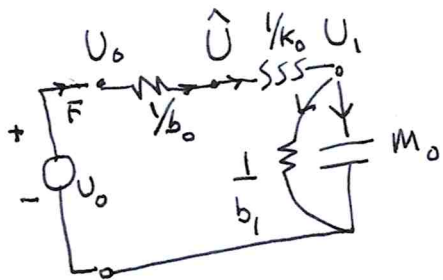


10 (a)



node U_0 : $F = \frac{\hat{U}_0 - \hat{U}_1}{1/b_0}$

node \hat{U} : $\frac{U_0 - \hat{U}}{1/b_0} = \frac{\hat{U} - U_1}{s/k_0}$

node U_1

$$\frac{\hat{U} - U_1}{s/k_0} = \frac{U_1}{1/b_1} + \frac{U_1}{M_0 s}$$

(b)

$$\left. \begin{aligned} U_0: f &= b_0 [u_0 - \hat{u}] \\ \hat{U}: b_0 [u_0 - \hat{u}] &= \left[\frac{\hat{u} - u_1}{s} \right] k_0 \end{aligned} \right\}$$

$$\frac{(\hat{u} - u_1) k_0}{s} = u_1 b_1 + u_1 M_0 s$$

$$\left. \begin{aligned} f &= b_0 [u_0 - \hat{u}] \\ b_0 [u_0 - \hat{u}] &= (\hat{u} - u_1) k_0 \\ (\hat{u} - u_1) k_0 &= u_1 b_1 + u_1 M_0 s \end{aligned} \right\}$$

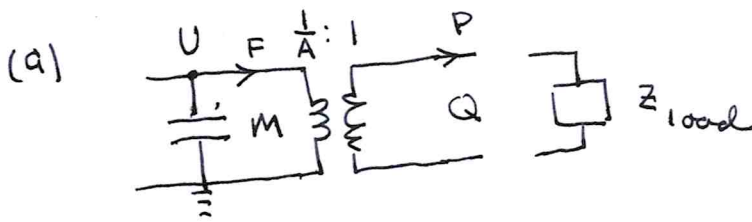
(c)

$$\frac{U_1}{U_0} = \frac{\frac{1}{b_1} \parallel \frac{1}{s M_0}}{\left(\frac{1}{b_0} + \frac{s}{k_0} \right) + \frac{1}{b_1} \parallel \frac{1}{s M_0}}$$

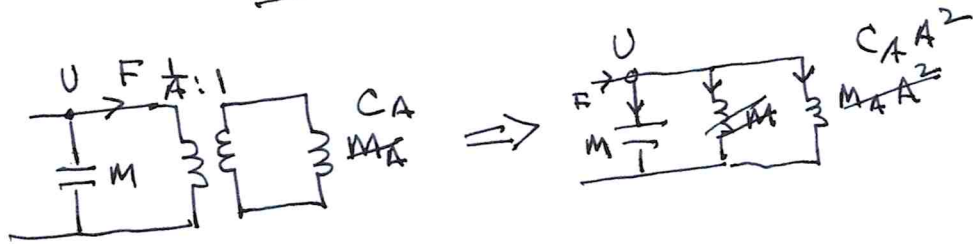
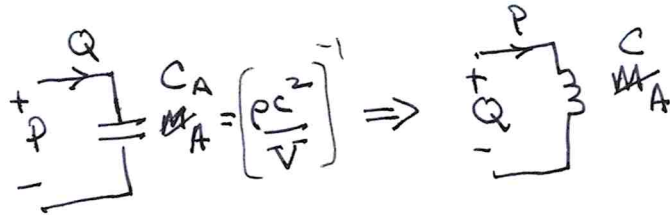
P. pressure $P = \frac{F}{A}$

$Q = \frac{U}{A}$

2.



acoustical

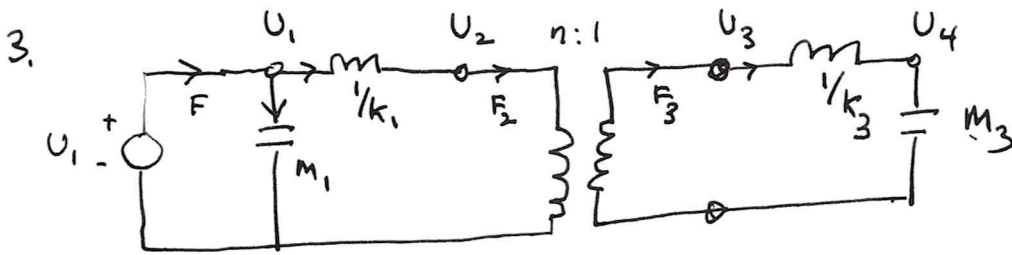


$$\frac{U}{Ms} + \frac{U}{sCA A^2} = P \Rightarrow \frac{1}{s} \left[Ms + \frac{1}{sCA A^2} \right] U = P$$

$$\Rightarrow \frac{M}{s} \left[s^2 + \frac{1}{CA MA^2} \right] U = F$$

M

$$s = \sqrt{\frac{1}{CA MA^2}}$$



$$n \equiv l_1/l_2$$

(a)

$$F = \frac{U_1}{\frac{1}{M_1 s}} + \frac{U_1 - U_2}{s/k_1}$$

$$F_3 = \frac{U_3 - U_4}{s/k_3}$$

$$U_2 \frac{1}{n} = U_3$$

$$F_2 n = F_3$$

$$\frac{U_3 - U_4}{s/k_3} = \frac{U_4}{\frac{1}{M_3 s}}$$

(b)

$$\frac{U_3}{F_3} = \frac{s}{k_3} + \frac{1}{M_3 s} = \frac{M_3 s^2 + k_3}{s M_3 k_3}$$

$$\boxed{\frac{U_2}{F_2} = \frac{U_3}{F_3} n^2}$$

(c)

$$\dot{F} = M_1 \ddot{u}_1 + k_1 (u_1 - u_2)$$

$$\dot{f}_3 = k_3 (u_3 - u_4)$$

$$u_2 = n u_3$$

$$f_2 n = f_3$$

$$M_3 [\ddot{u}_3 - \ddot{u}_4] = k_3 u_4$$