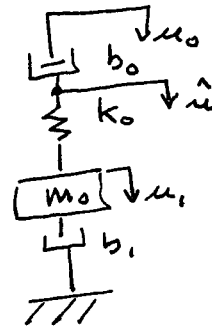


1° Consider the mechanical system where  $u_0$  and  $u_1$  are velocities

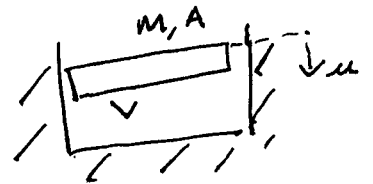
(a) Using the mobility analogy where velocity is the across variable and force is the through variable draw the electro-mechanical system



$b_0, b_1$  damper  
 $m_0$  mass  
 $k$  spring

(b) Determine the eqns of motion in terms of ODE's  
 (c) Evaluate the transfer function  $U_1(s) / U_0(s)$

2° A mass  $M$  is placed as a rigid wall in a <sup>closed</sup> box.



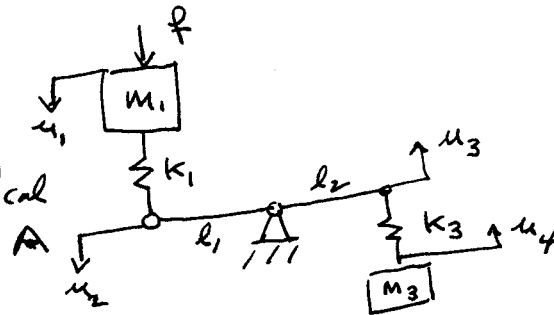
The volume of the air enclosed is denoted by  $V$  and area of the mass is equal to  $A$ .

(a) Determine the equivalent system/circuit using the pressure is the across variable and the volume velocity  $Q = uA$  is the through variable.

(b) Determine frequency of resonance

3° Consider the system

(a) Determine the electro-mechanical circuit using the mobility analogy



(b) What is the load  $(U_2/F_2)$  looking into node  $U_2$

(c) Determine the equation of motion