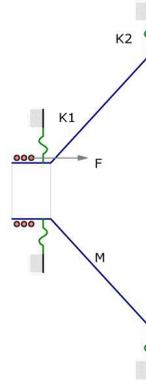
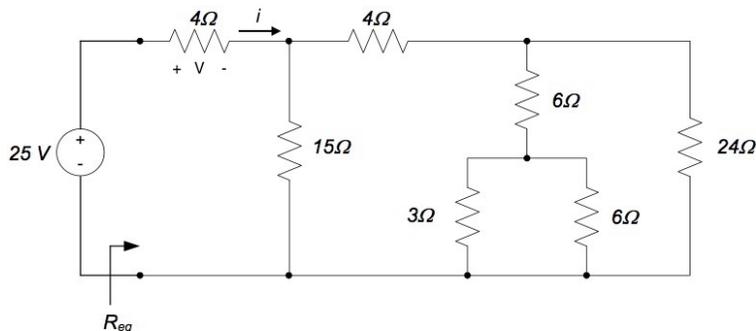


## Problem 1



1. Redraw the loudspeaker driver as a mass-spring system where  $M$  is the mass of the cone,  $K1$  is the stiffness of the spider and  $K2$  is the stiffness of the surround. Include a ground as a reference frame.
2. Assuming the driver cone has a velocity  $v$ , define the force  $F$  in terms of its mass and stiffnesses.
3. Assuming the displacement  $x$  of the speaker can be modelled as  $x = e^{j\omega t}$ , express the total impedance of driver in the Laplace domain.
4. Assuming the mass of the cone is  $60$  grams and the stiffness of the spider and suspension to be  $2 \cdot 10^3$  N/m, calculate the natural resonance frequency of the driver.

## Problem 2



1. Find  $R_{eq}$  (4 points)
2. Find the voltage  $V$  and the current  $i$  (4 points)
3. Find the power absorbed by the  $24\ \Omega$  resistor. (3 points)

## Problem 3

Find the current  $I$  using nodal analysis. (6 points)

