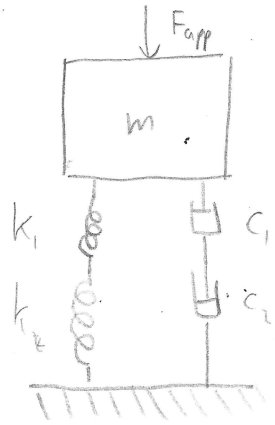
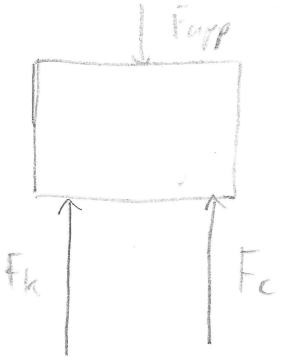
20-R-VIB-DY-39 Intermediate

A mass, $m = 25\,kg$, is supported by two springs in series and two dampers in series. The dampers each have a damping constant $c = 100\ Ns/m$ and the springs each have a spring constant $k = 100\ N/m$. If a force $f = 15\cos 2t$ is applied to the mass, determine an equivalent electrical analog system to the damped forced system and the coefficients



Solution FBD:



$$\Sigma F_y = -ma$$

$$ky + c\dot{y} - F_{app} = -m\ddot{y}$$

$$m\ddot{y} + c\dot{y} + ky = F_{app}$$

$$k = \frac{k_1 k_2}{k_1 + k_2} = 50\ N/m$$

$$c = \frac{c_1 c_2}{c_1 + c_2} = 50\ Ns/m$$

$m = L = 25\ H$

$c = R = 50\ \Omega$

$k = \frac{1}{C} \quad C = 0.02\,F$

$F(t) = E(t) = 15\cos 2t$

coefficients