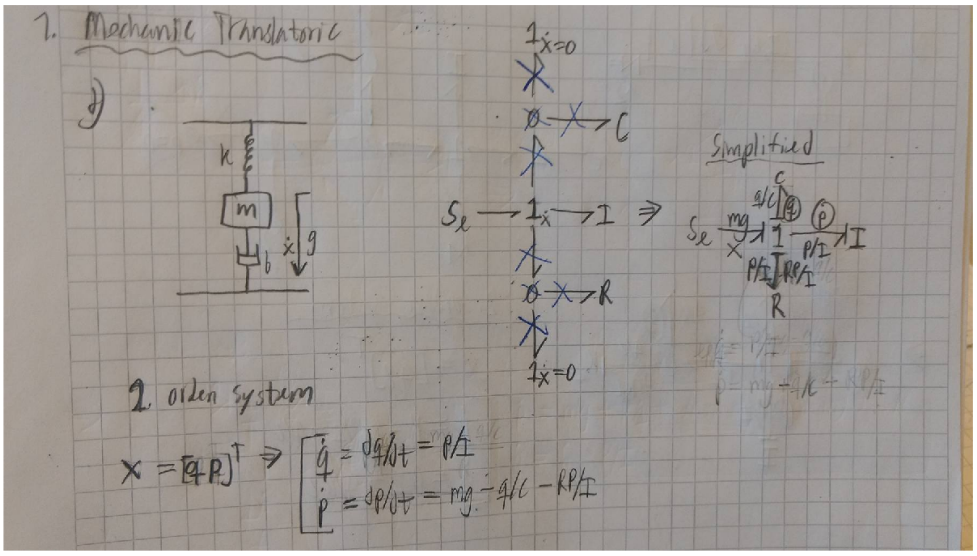
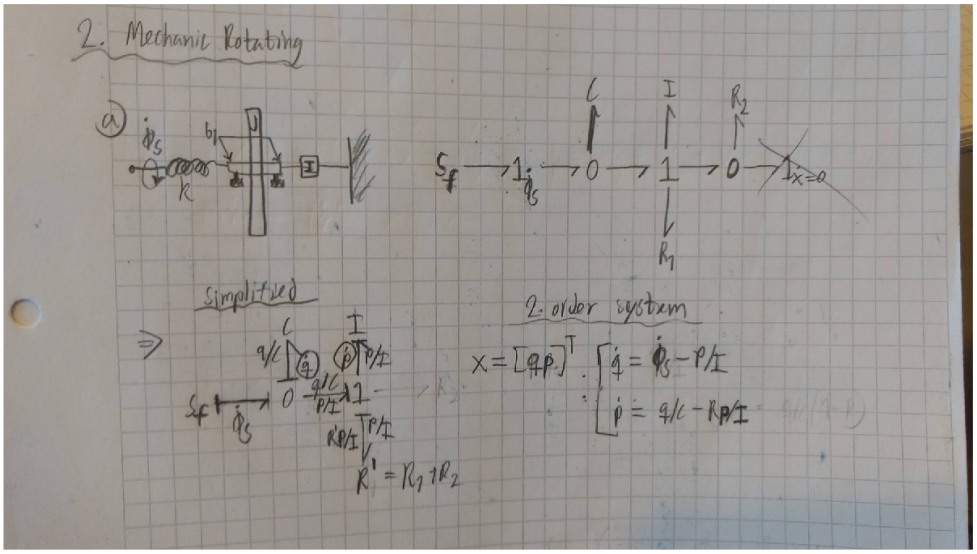
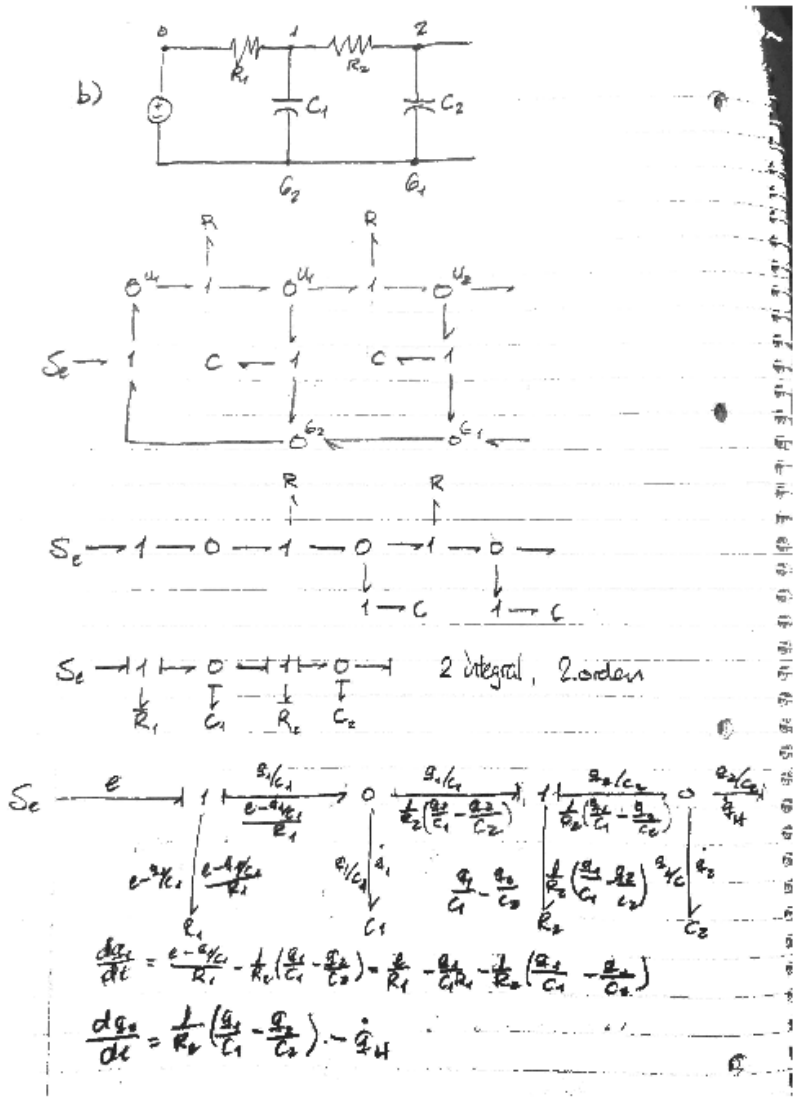
```
clear all
close all
clc
```

Bond Graphs

```
img = imread('1_d.jpg');
img2 = imread('2_a.jpg');
img3 = imread('3_b.png');
img4 = imread('4_a.jpg');
figure, imshow(img);
figure, imshow(img2);
figure, imshow(img3);
figure, imshow(img4);
```

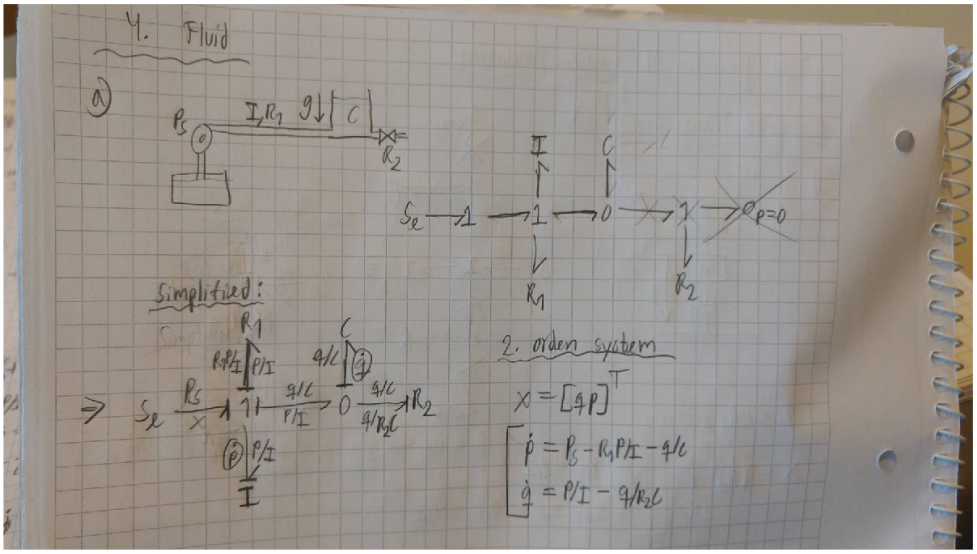



2. Mechanic Rotating
Simplified
2. order system
$R' = R_1 + R_2$
$\dot{q} = \dot{\phi}_s - p/I$
$\dot{p} = q/C - Rp/I$



$$\frac{dq_1}{dt} = \frac{e - q_1/C_1}{R_1} - \frac{1}{R_2}\left(\frac{q_1}{C_1} - \frac{q_2}{C_2}\right) = \frac{e}{R_1} - \frac{q_1}{C_1 R_1} - \frac{1}{R_2}\left(\frac{q_1}{C_1} - \frac{q_2}{C_2}\right)$$

$$\frac{dq_2}{dt} = \frac{1}{R_2}\left(\frac{q_1}{C_1} - \frac{q_2}{C_2}\right) - \dot{q}_H$$



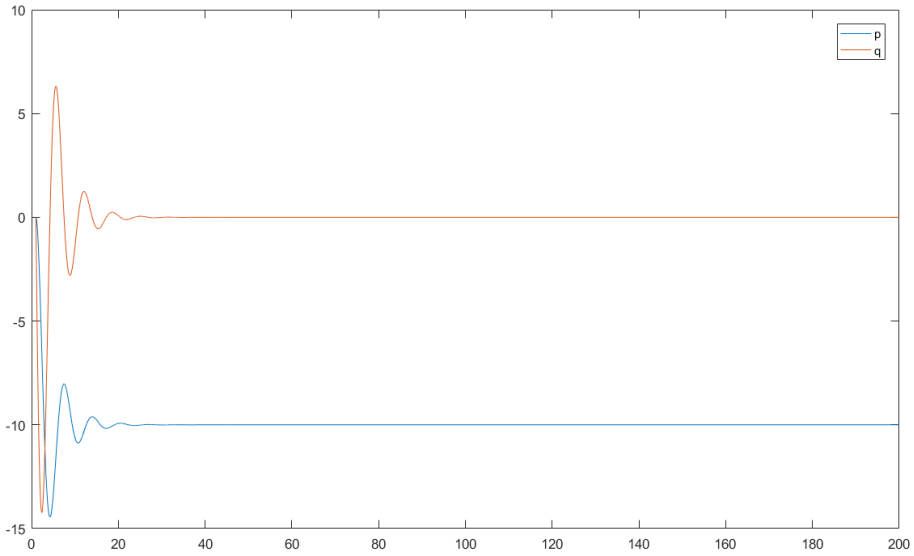
Simulation

```
g = -10;
m = 2;
k = 2;
R = 1;

I = m;
c = 1/k;
q_0 = 0;
p_0 = 0;

x_0 = [q_0 ; p_0];
dx_dt = @(t, x) [x(2)/I ; m*g - x(1)/c - R*x(2)/I];
[t, x] = ode45(dx_dt, 1:.01:200, x_0);

plot(t, x)
legend('p', 'q')
```



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