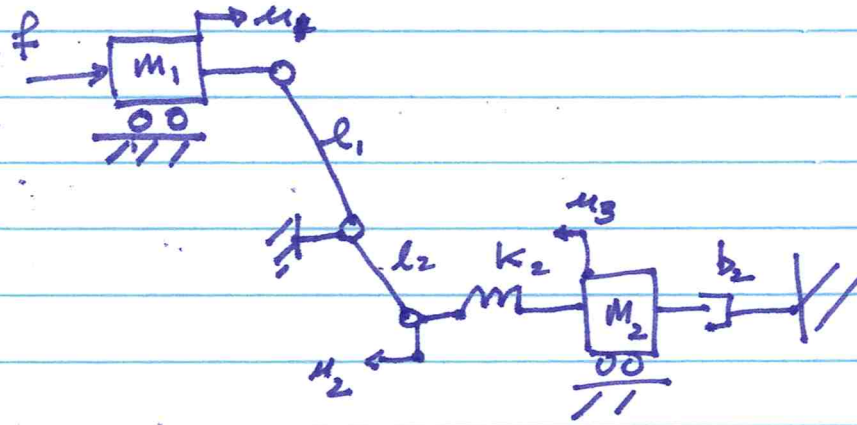


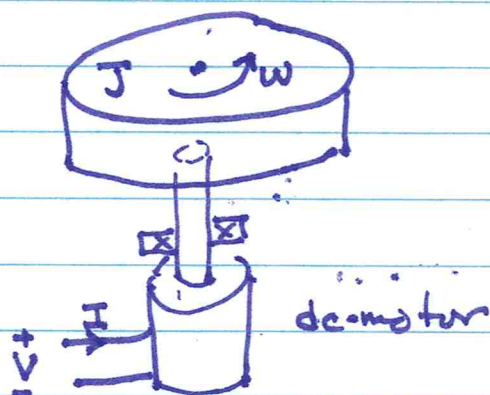
1. Consider the system in the aforementioned diagram where A is the cross-sectional area of the mass
 - (a) Using the mobility analogy draw the equivalent circuit
 - (b) Determine the governing eqn of motion
 - (c) Find $U_2(s)/U_1(s)$

2. Consider the system



- Draw the equivalent circuit
- Determine equations of motion

3. Consider the fly-wheel energy storage device

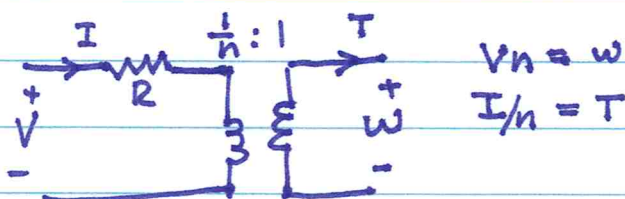


$$J\dot{\omega} = T$$

$$k\int\omega dt = T$$

$$b\omega = T$$

dc motor model



$$Vn = \omega$$

$$I/n = T$$

where J is the mass moment of inertia, k rotational shaft stiffness, b is the ^{rotational} damping coeff, T is the torque ω is the angular velocity.

- Draw the equivalent circuit of the system where ω is the across variable and T is the through variable
- Determine the eqns of motion
- Determine the open-circuit voltage as a function of time given that J is moving with $\omega(0)$ at $t=0$ and $k=0$