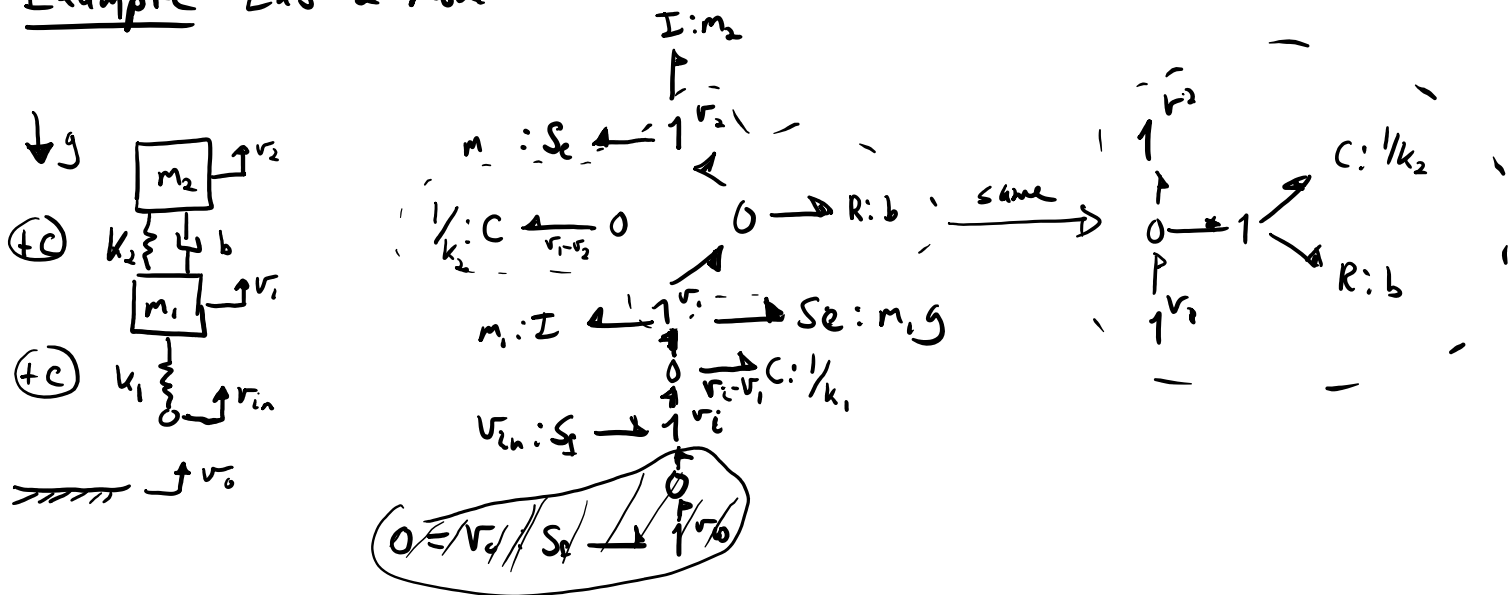


Midterm: Materials Covered

- Book: Ch 1 → 4.2.1
- HW: 1 → 4 but not 4.5 (move it to HW 5)
- Lab 1 (ODE best practices, shared code)
- Lecture materials up to today
- HW 4 & Lab 2 due Friday

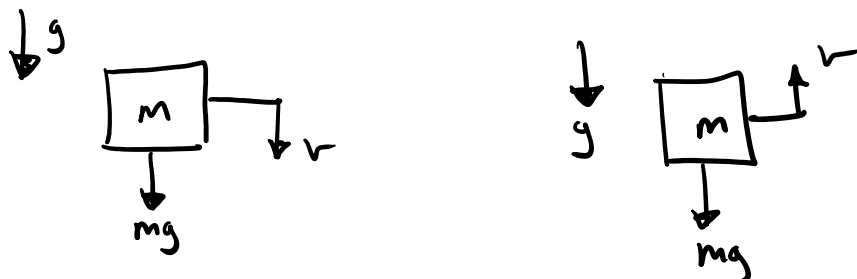
Example Lab 2 model



Sign Conventions

gravitational forces (constant forces on earth)

We desire a power sign convention the inputs kinetic energy to the inertia.





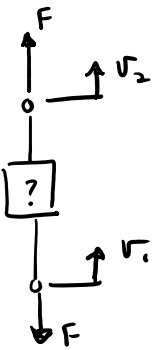
$$mg: Se \xrightarrow{\frac{mg}{r}} 1 \xrightarrow{\frac{m\dot{v}}{r}} I: m$$

$$\begin{aligned} \dot{p} &= \Sigma F \\ \dot{p} &= m\dot{v} = mg \\ m\dot{v} - mg &= 0 \end{aligned}$$

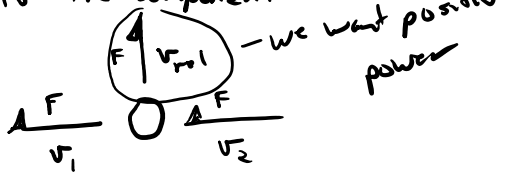
$$mg: Se \xleftarrow{\frac{mg}{r}} 1 \xrightarrow{\frac{m\dot{v}}{r}} I: m$$

$$\begin{aligned} \dot{p} &= \Sigma F \\ m\dot{v} &= -mg \\ m\dot{v} + mg &= 0 \end{aligned}$$

Compression or tension is positive



declare that "tension" produces positive power to the component

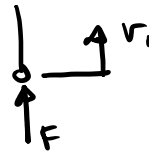
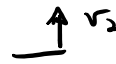


$$v_{rel} + v_1 - v_2 = 0$$

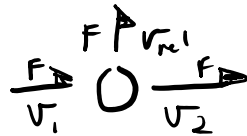
$$v_{rel} = v_2 - v_1$$

$$P_? = F v_{rel}$$

$$P_? = Fv_2 - Fv_1$$



declare that "compression" produces positive power to the component



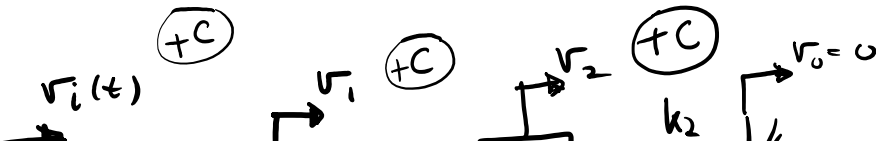
$$v_{rel} - v_1 + v_2 = 0$$

$$v_{rel} = v_1 - v_2$$

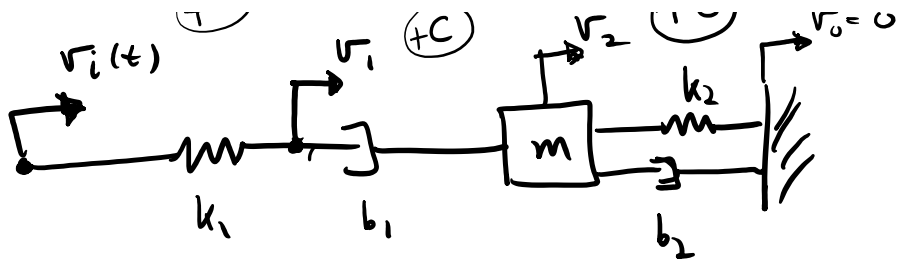
$$P_? = Fv_1 - Fv_2$$

Exercise

clue: 3 non-zero velocities



positive in compression



Compression

