- Disp. based design

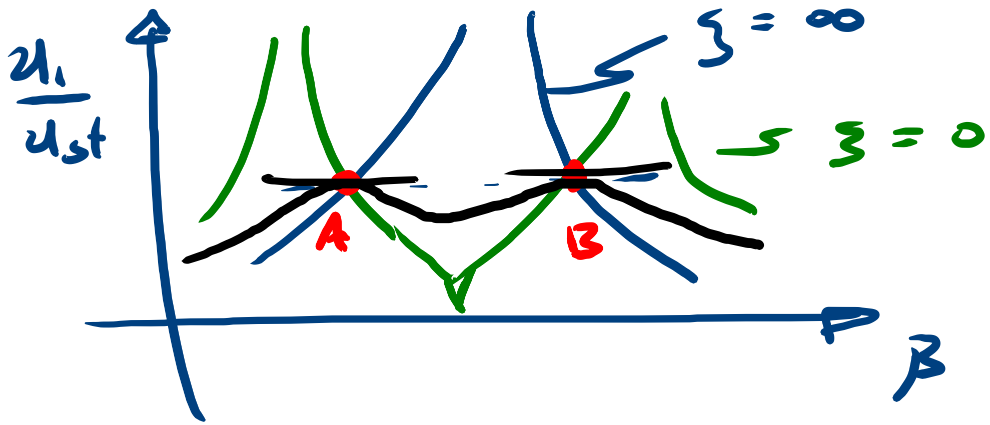
$$u_{max} = \frac{F_0}{k} H_u \qquad H_u = R$$

- Force - based design (isolation)

$$F_0 \sin \omega t$$

$$s = S_0 \sin(\omega t + \phi)$$

$$S_{max} = F_0 H_s$$



Step 1 - Locate A & B

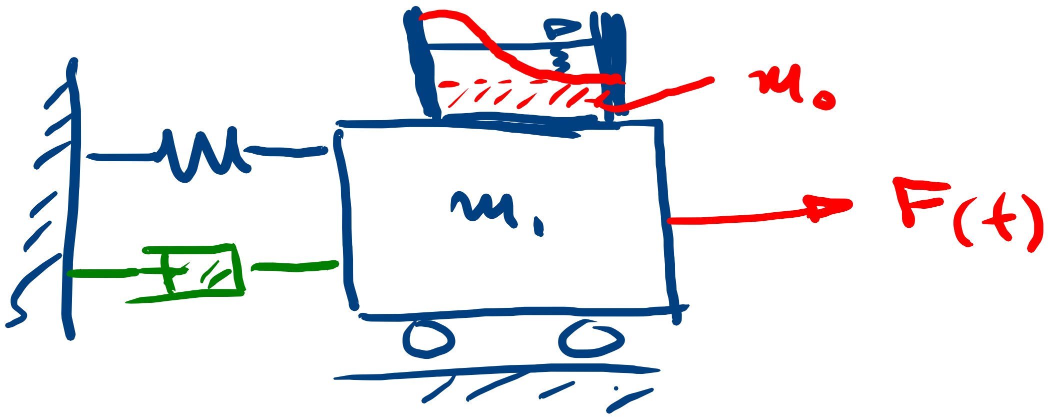
Step 2 - Ordinates of A & B are equal

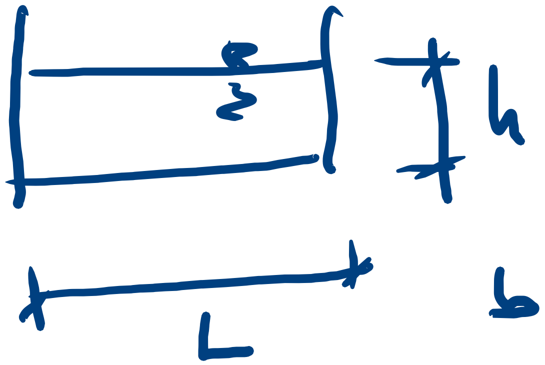
$$f_{op} = \frac{1}{1+\mu}$$

Step 3 - slope @ A & B = 0

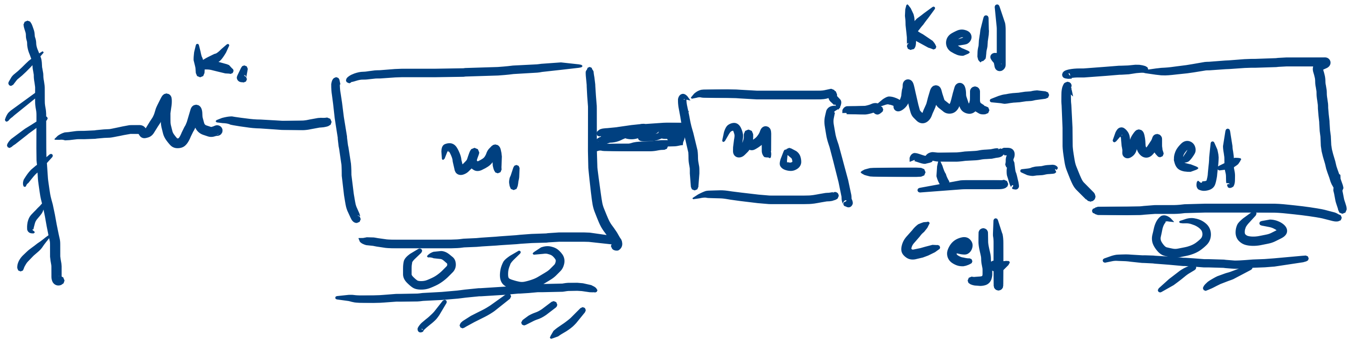
$$\xi_{op} =$$

Liquid TMD - LMD - Sloshing dampers





Equivalent model



h: height still water

L: length water container

b: width water container

m_w: Total still water

m_0: mass of quiescent fluid

ρ_w = density of fluid

$$m_{eff} = \frac{8 \tanh\left(\frac{\pi h}{L}\right)}{\pi^3 \frac{h}{L}} m_w$$

$$K_{eff} = \frac{8 \rho_w b L g}{\pi^2} \tanh^2\left(\frac{\pi h}{L}\right)$$

eff. freq.

$$\omega_{eff} = \sqrt{\frac{\pi g}{L} \tanh\left(\frac{\pi h}{L}\right)}$$

$$c_{eff} = 2 \zeta_w \, m_{eff} \, \omega_{eff}$$

$$\zeta_w = \left(\frac{1}{2h}\right) \sqrt{\frac{\nu_w}{2 \omega_{eff}}} \left(1 + \frac{2h}{b} + sc\right)$$

ν_w = kinetic viscosity of water (10^{-6} m^2/s)

sc = surface contamination coeff. ($sc = 1$)

⇒ I have also typed these expressions in the Jupyter notebook on vibration absorbers.