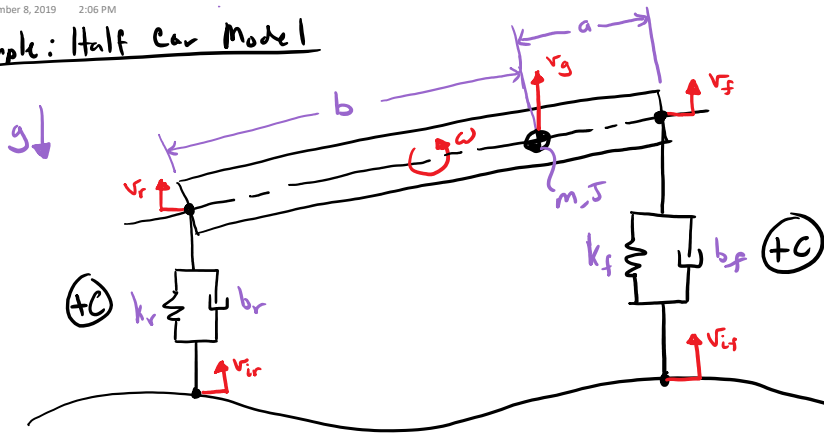


Example: Half car Model



Assumptions

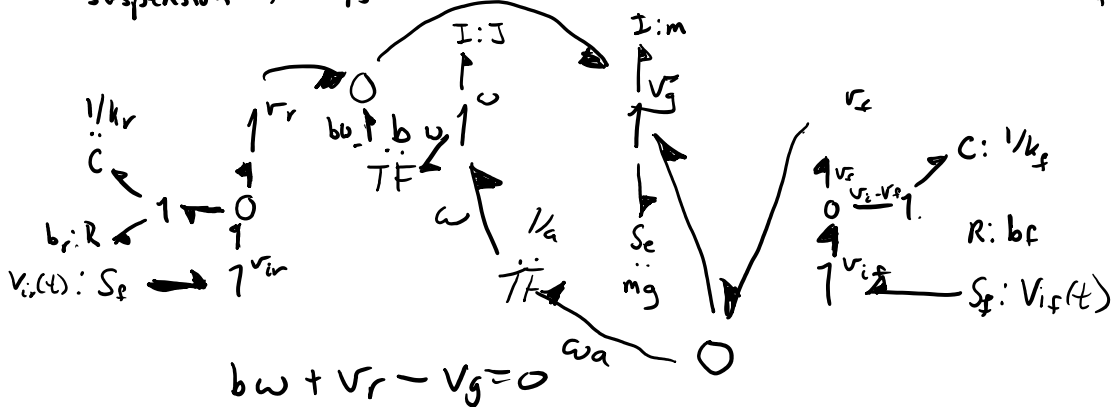
- small rotation of car body
- ignore longitudinal dynamics
- suspension: k, b lumps shocks & tires

$$v_f = v_g + \omega a$$

$$v_r = v_g - \omega b$$

$$v_g^P = v_g^C + \omega r$$

$$v_f - v_g - \omega a = 0$$

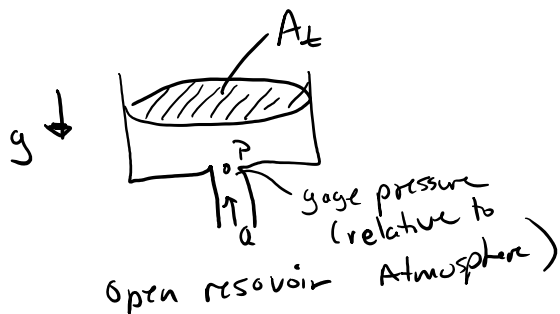


Hydraulic, Pneumatic, Quasi-static Fluid Systems

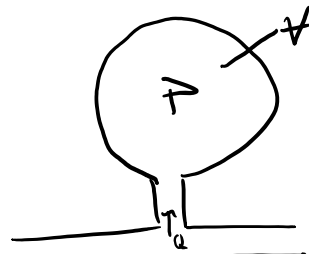
* based on assumptions of hydrostatic (high pressures / low fluid velocity)

$Re < 5000 \Rightarrow$ laminar flows

Ports



$$C: \frac{A_t}{\rho g}$$



gas filled tank
"acoustic approximation"

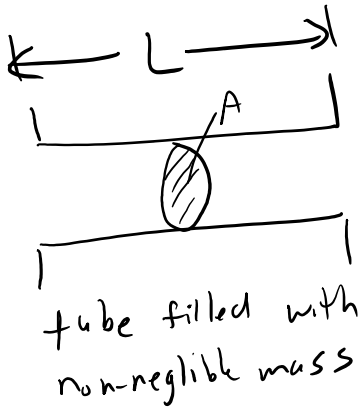
$$C: \frac{V}{\rho c^2}$$

↑
density gas
speed of sound through gas

"acoustic approximation"

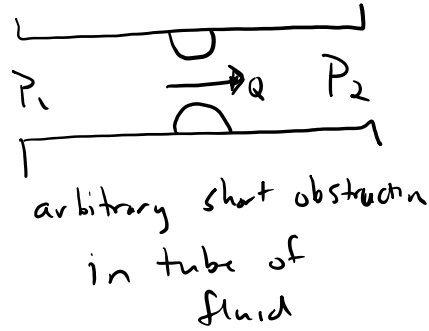
$$c = \frac{At}{\rho g}$$

↑
L density



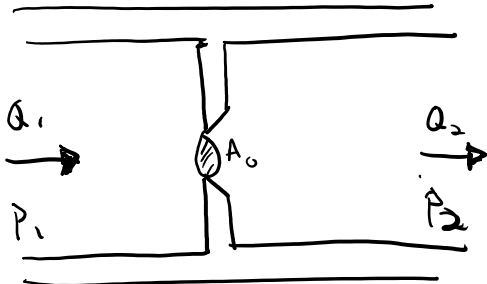
$$I = \frac{\rho L}{A}$$

↑



$$\frac{\Delta P}{Q} = R$$

generally non-linear



Sharp edge circular orifice

$$\Delta P = \frac{\rho \Delta Q |Q|}{2 C_d^2 A_0^2}$$

discharge coeff