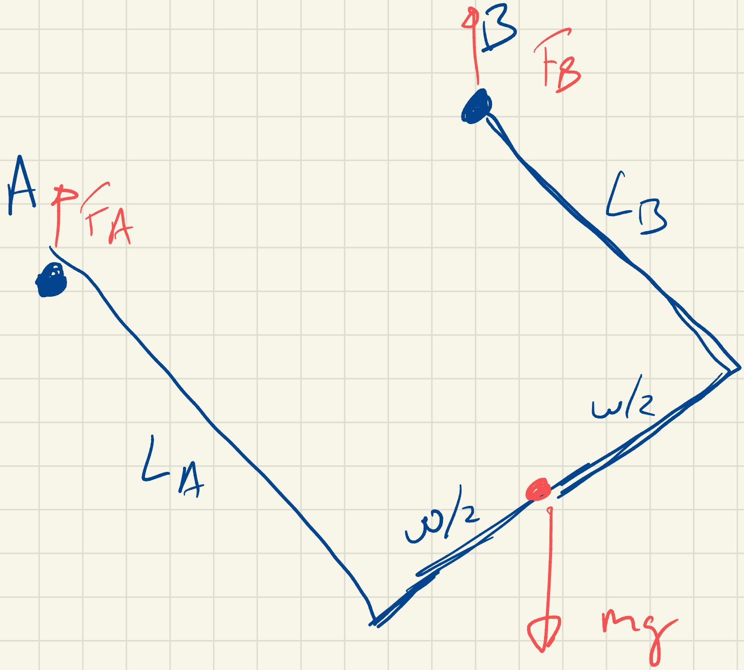
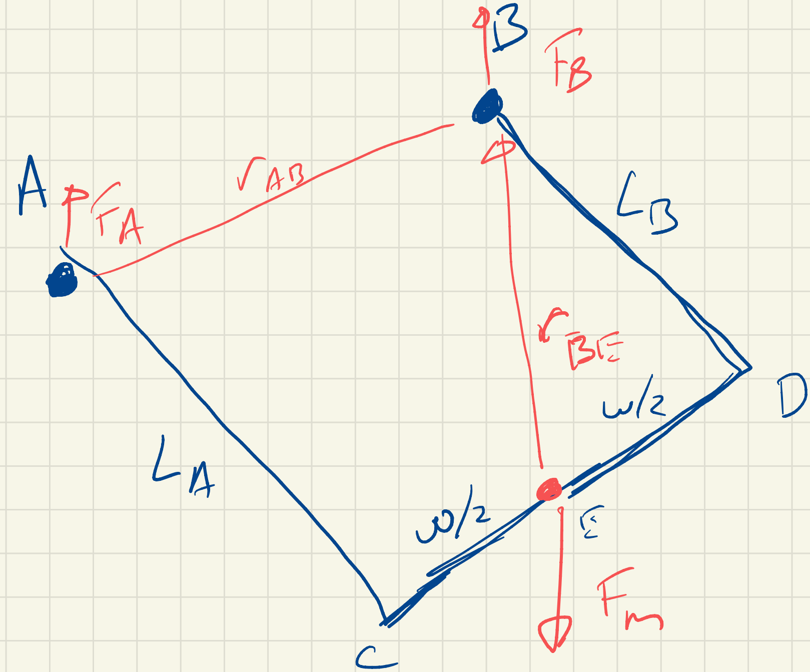



$$\sum \vec{F} = 0 \qquad \sum \vec{\Gamma} = 0$$

we want the point where $\vec{F}_A = 0$

$\cancel{F_A}_{0} + F_B + mg = 0$

This is the Lift-Off point




$\sum \vec{F} = 0 \qquad \sum \vec{\Gamma} = 0$

Take Torque around B,

we want case where $F_A = 0$

$$\sum \Gamma = 0 \qquad \cancelto{0}{\vec{F}_A \times \vec{r}_{AB}} + \vec{F}_m \times \vec{r}_{BE} + \cancelto{0}{\vec{F}_B \times \vec{r}_{BB}}$$

$$\vec{F}_m \times \vec{r}_{BE} = 0$$

$\sum \vec{F} = 0 \qquad \sum \vec{\Gamma} = 0$

Take Torque around B,
we want case where $F_A = 0$

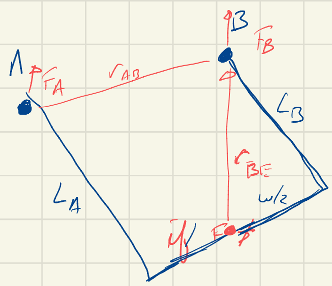
$$\sum \Gamma = 0 \qquad \underbrace{\vec{F}_A \times \vec{r}_{AB}}_{0} + \vec{F}_m \times \vec{r}_{BE} + \underbrace{\vec{F}_B \times \vec{r}_{BB}}_{0}$$

$$\vec{F}_m \times \vec{r}_{BE} = 0$$

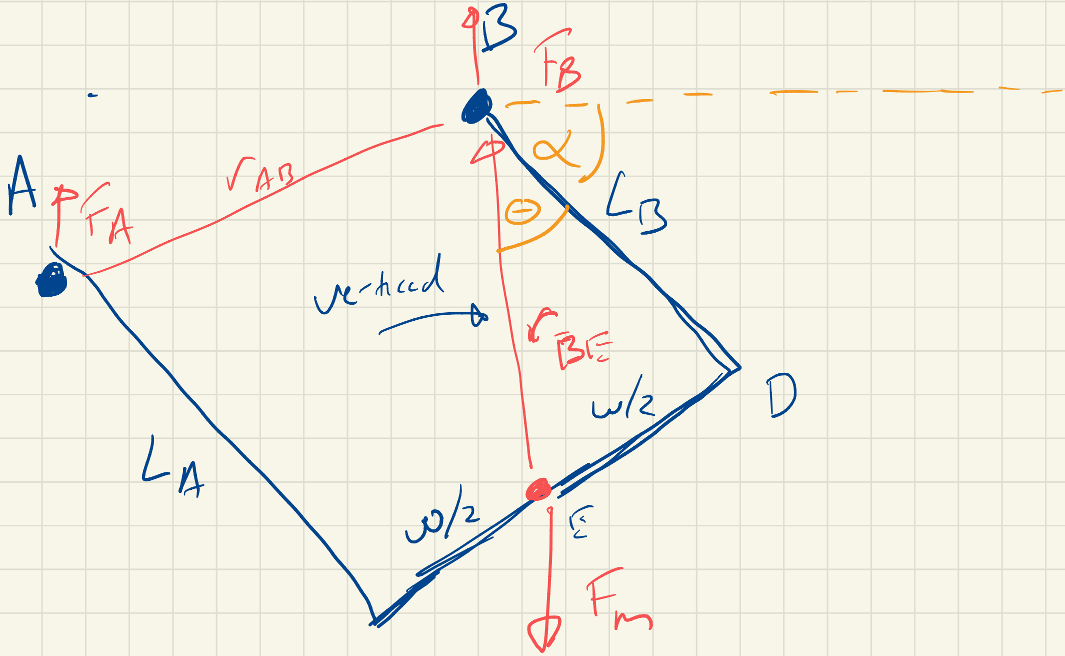
$\vec{F}_m \times \vec{r}_{BE} = 0 \rightarrow$ if $F_m \neq 0$ and $\vec{r}_{BE} \neq 0$

Then $\vec{F}_m$ must be parallel to $\vec{r}_{BE}$

In other words the c.g. must hang directly below the suspension point (it hanging By one point)



So we can now figure the geometry where the frame hangs w/o touching $P_A$




$$\boxed{\tan\theta = \frac{\frac{w}{2}}{L_B}}$$

$$\boxed{\theta + \alpha = 90^\circ}$$

# Observations on Results

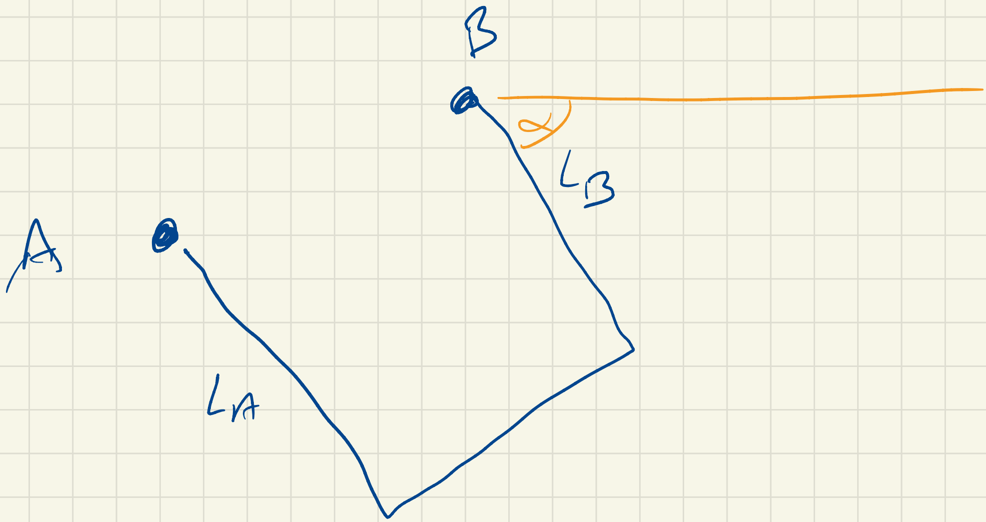
$$\boxed{\tan\theta = \frac{\frac{w}{2}}{L_B}}$$

1) angle does not depend on mass

2) angle does not depend on $L_A$

    2a) No weight there in this model

    2b) No forces of contact there.




Given the frame hangs at angle $\alpha$ we can then see if for a given $L_A$ we hit point A, this is better done with a calculator, so I stop here