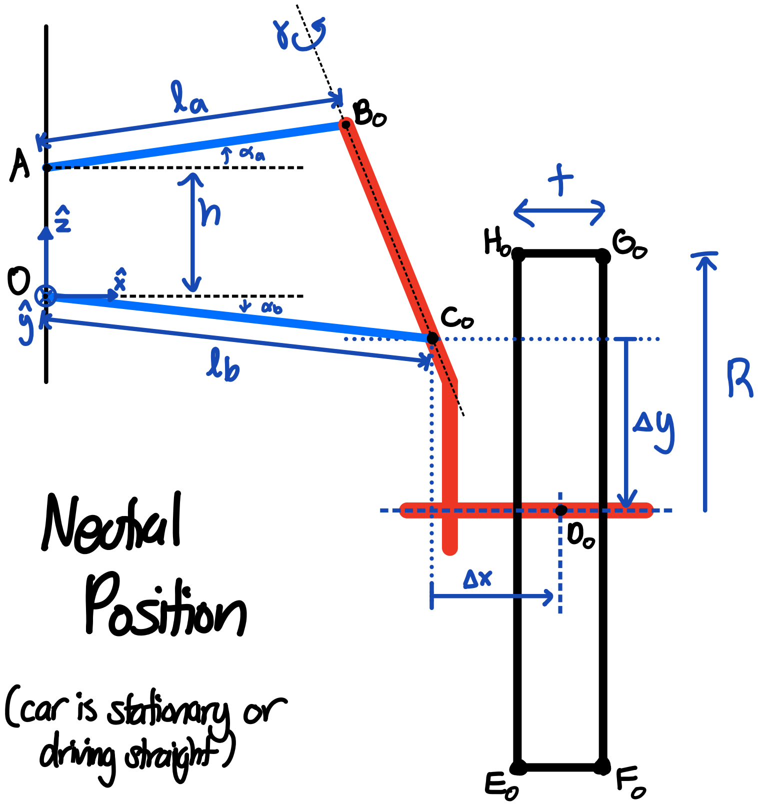
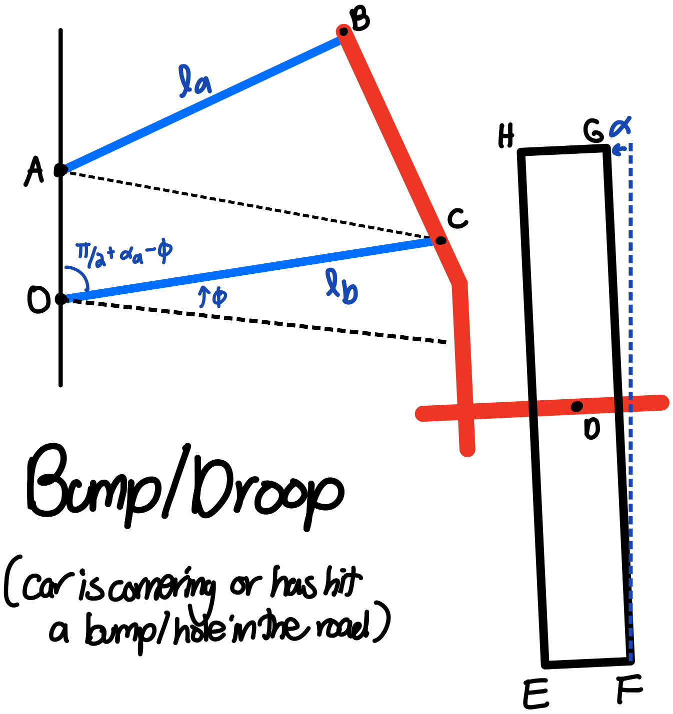


Neutral Position

(car is stationary or driving straight)



Bump/Droop

(car is cornering or has hit a bump/hole in the road)

$$\vec{OC_0} = l_b(\cos\alpha_b, \sin\alpha_b)$$

$$\vec{OA} = (0, h)$$

$$\vec{AB_0} = l_a(\cos\alpha_a, \sin\alpha_a)$$

$$\vec{B_0C_0} = \vec{OC_0} - \vec{OB_0}$$

$$\vec{C_0D_0} = (\Delta x, \Delta y)$$

$$\vec{D_0}^{E_0/F_0/}_{H_0/G_0} = (\pm t/2, \pm R)$$

$$R(\theta) = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

$$\vec{OC} = l_b(\cos(\alpha_b+\phi), \sin(\alpha_b+\phi))$$

$$AC^2 = h^2 + l_b^2 - 2hl_b\cos(\pi/2+\alpha_a-\phi)$$

$$\frac{\sin\angle OAC}{l_b} = \frac{\sin(\pi/2+\alpha_a-\phi)}{AC}$$

$$\hookrightarrow \angle OAC = \sin^{-1}\left(\frac{l_b}{AC}\sin(\pi/2+\alpha_a-\phi)\right)$$

$$B_0C_0^2 = l_a^2 + AC^2 - 2 l_a AC \cos\angle CAB$$

$$\hookrightarrow \angle CAB = \cos^{-1}\left(\frac{l_a^2 + AC^2 - B_0C_0^2}{2 l_a AC}\right)$$

$$\vec{AB} = l_a(\cos(\angle OAB - \pi/2), \sin(\angle OAB - \pi/2))$$

$$\alpha = \cos^{-1}\left(\frac{\vec{B_0C_0}\cdot\vec{BC}}{\vec{B_0C_0}\cdot\vec{B_0C_0}}\right)$$

$$\vec{CD} = R(\alpha)\vec{C_0D_0}$$

$$\vec{D}^{E/F/}_{H/G} = R(\alpha)\vec{D_0}^{E_0/F_0/}_{H_0/G_0}$$