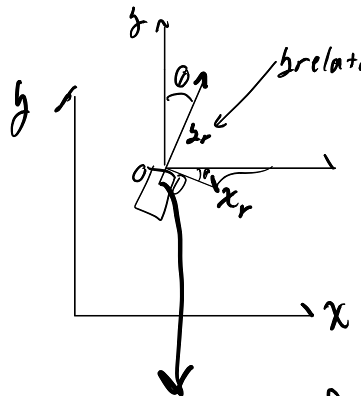
angular → $V_2 = V_1$ $\quad \frac{d\theta}{dt} = 0$ ← orientation of car whith respect to y = axis



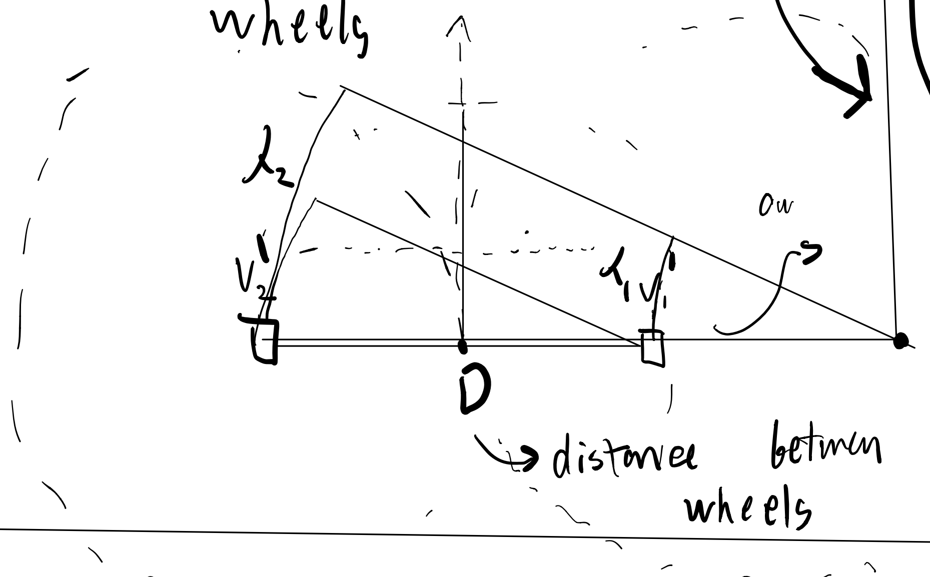
point of origin is midpoint between wheels

relation

$$\frac{dy}{dt} = \frac{dy_r}{dt}\cos\theta - \frac{dx_r}{dt}\sin\theta$$

$$\frac{dx}{dt} = \frac{dx_r}{dt}\cos\theta + \frac{dy_r}{dt}\sin\theta \qquad \lambda = V_r \cdot dt$$

current relative Axis



→ distance between wheels

rotation

if $v_1' = 0$

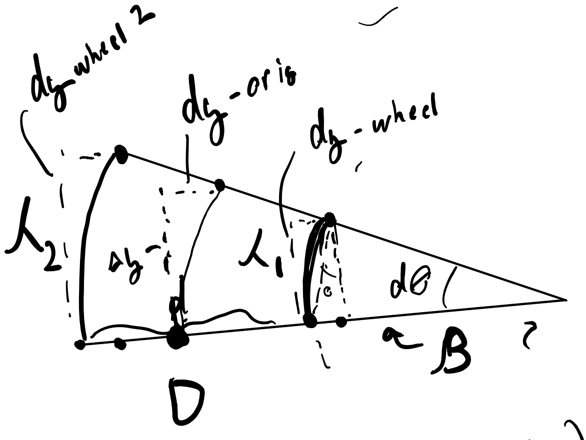
$$B\,d\theta = \lambda_1$$

$$(B + D)\,d\theta = \lambda_2$$

$$D\,d\theta = \lambda_2 - \lambda_1$$

$$\boxed{d\theta = \frac{\lambda_2 - \lambda_1}{D}}$$

$$\boxed{\frac{d\theta}{dt} = \frac{V_2 r - V_1 r}{D}}$$

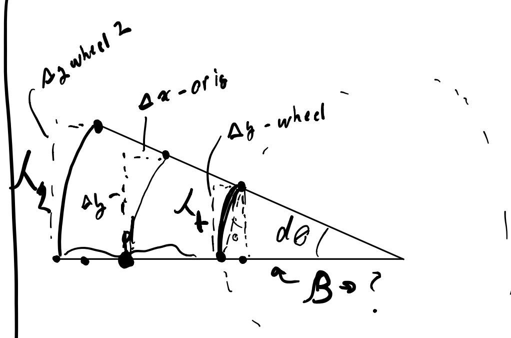


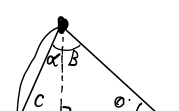
$$dy_{w_1} = \overset{\frac{\lambda_1}{d\theta}}{B}\sin(d\theta)$$

$$dy_{w_2} = (B + D)\sin(d\theta)$$

$$d_y = avg(d_{yw_1}, d_{w_2}) = \left(\frac{\lambda_1 + \lambda_2}{2\,d\theta}\right)\sin(d\theta)$$

$$d_y = \frac{D}{2}\left(\frac{\lambda_1 + \lambda_2}{\lambda_2 - \lambda_1}\right)\sin\left(\frac{\lambda_2 - \lambda_1}{D}\right)$$





$C + \alpha + 90 = 180$

$\theta + B + 90 = 180$

$\theta + B + \alpha + C = 180$

$$\lim_{\lambda_2-\lambda_1\to 0} dy \Rightarrow \frac{\frac{d}{\lambda_2-\lambda_1}\left(\cancel{D}\,\lambda_1+\lambda_2\cos\left(\frac{\lambda_2-\lambda_1}{D}\right)\cdot\frac{1}{\cancel{D}}\right)}{2\,\frac{d}{\lambda_2-\lambda_1}\left(\lambda_2-\lambda_1\right)} = \frac{\lambda_1+\lambda_2}{2} = \boxed{\begin{matrix}\lambda_1 \\ \shortparallel \\ V_1 r\,dt\end{matrix}}$$

$$dy = \frac{D}{2}\left(\frac{V_1 \cancel{r}\,\cancel{dt} + V_2 \cancel{r}\,\cancel{dt}}{V_2 \cancel{r}\,\cancel{dt} - V_1 \cancel{r}\,\cancel{dt}}\right)\sin\left(\frac{V_2 r\,dt - V_1 r\,dt}{D}\right)$$ makes sense!

$$dy = \frac{D}{2}\left(\frac{V_2+V_1}{V_2-V_1}\right)\sin\left(\left(\frac{V_2 r\,dt - V_1 r\,dt}{D}\right)\right)$$

$$dx = \frac{D}{2}\left(\frac{V_2+V_1}{V_2-V_1}\right)\cos\left(\left(\frac{V_2 r\,dt - V_1 r\,dt}{D}\right)\right)$$

$\downarrow$

these are relative to current axis $\theta_r = 0$

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relative

$$\text{true } \frac{dy}{dt} = \frac{dy_r}{dt}\cos\theta - \frac{dx_r}{dt}\sin\theta$$

$$\frac{dx}{dt} = \frac{dx_r}{dt}\cos\theta + \frac{dy_r}{dt}\sin\theta$$