

$$V_G = \omega R_G$$

$$V_H = \omega R_H$$

$$\therefore R_G = c + R_H$$

$$\therefore V_G = \omega c + \omega R_H$$

$$\Rightarrow V_G = \omega c + V_H$$

$$\boxed{V_G - V_H = \omega \cdot c}$$

$$\cot \alpha = \frac{FD}{OD} = \frac{FE + ED}{OD} = \frac{c}{d} + \frac{ED}{d}$$

$$\cot \beta = \frac{ED}{OD} = \frac{ED}{d}$$

$$\therefore \cot \alpha = c/d + \cot \beta$$

$$\boxed{\cot \alpha - \cot \beta = c/d}$$

$$\therefore V_G = \frac{\omega d}{\tan \alpha}$$

$$V_H = \frac{\omega d}{\tan \beta}$$

$$V_F = \omega \cdot R_F$$

$$V_E = \omega \cdot R_E$$

$$\therefore R_F = \frac{OD}{\sin \alpha} = \frac{d}{\sin \alpha}$$

$$V_G = \omega \cdot R_G$$

$$V_H = \omega \cdot R_H$$

$$R_E = \frac{OD}{\sin \beta} = \frac{d}{\sin \beta}$$

$$R_G = \frac{OD}{\tan \alpha} = \frac{d}{\tan \alpha}$$

$$R_H = \frac{OD}{\tan \beta} = \frac{d}{\tan \beta}$$

$$\therefore V_F = \frac{\omega d}{\sin \alpha}$$

$$V_E = \frac{\omega d}{\sin \beta}$$

$$V_G = \frac{\omega d}{\tan \alpha}$$

$$V_H = \frac{\omega d}{\tan \beta}$$

$$\frac{V_G}{V_F} = \frac{\frac{\cos \alpha}{\sin \alpha}}{\frac{1}{\sin \alpha}}$$

$$\Rightarrow \boxed{\frac{V_G}{V_F} = \cos \alpha}$$

$$\frac{V_H}{V_E} = \frac{\frac{\cos \beta}{\sin \beta}}{\frac{1}{\sin \beta}}$$

$$\Rightarrow \boxed{\frac{V_H}{V_E} = \cos \beta}$$

$$CB = \frac{OC}{\tan \theta} = \frac{OD}{\tan \beta} \Rightarrow \frac{b}{\tan \theta} = \frac{d}{\tan \beta}$$

$$\Rightarrow \boxed{\frac{\tan \theta}{\tan \beta} = \frac{b}{d}}$$

We know that,

$$V = \omega R$$

$$\Rightarrow R = V/\omega \quad \therefore V/\omega = R = \sqrt{\left(d - \left(\frac{b+d}{2}\right)\right)^2 + \left(\frac{c}{2} + \frac{b}{\tan \theta}\right)^2}$$

$$\therefore \frac{V}{\omega} = R = \sqrt{\left(\frac{d-b}{2}\right)^2 + \left(\frac{c}{2} + \frac{b}{\tan \theta}\right)^2}$$

Known value

with $\theta \rightarrow$ Find ϕ, α, β

$$V_B = \omega \cdot R_B = \frac{\omega \cdot b}{\sin \theta} \rightarrow \text{All known values so find } V_B \text{ then with eqns find all remaining velocities.}$$

Then after finding all linear velocity find the angular velocity of each wheel by $V = R\omega$
 \downarrow
 Radius of wheel.

