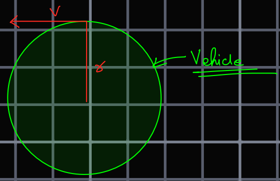
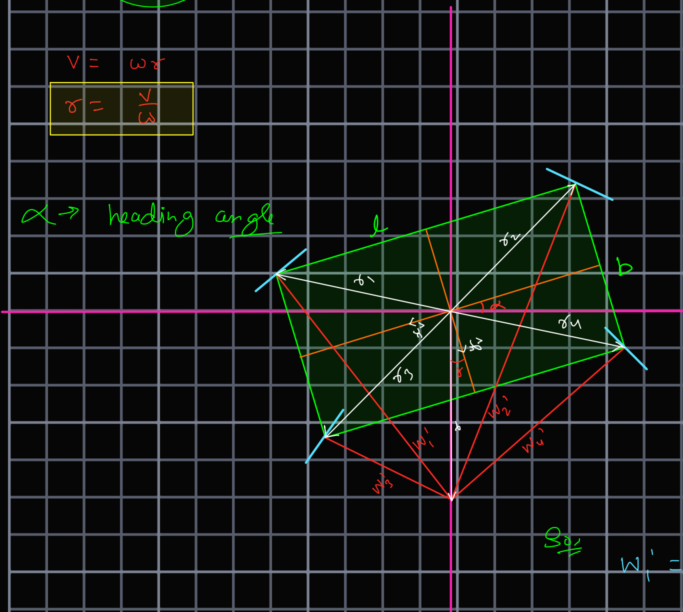


$v = \omega r$

$$\boxed{r = \frac{v}{\omega}}$$

$\alpha \rightarrow$ heading angle



$$W_i' = \vec{r}_i - \vec{r}$$

here

$$\vec{r}_1 = \left(\frac{l}{2}\right)\hat{x}_v - \left(\frac{b}{2}\right)\hat{y}_v$$

$$\vec{r}_2 = \left(-\frac{l}{2}\right)\hat{x}_v - \left(\frac{b}{2}\right)\hat{y}_v$$

$$\vec{r}_3 = \left(\frac{l}{2}\right)\hat{x}_v + \left(\frac{b}{2}\right)\hat{y}_v$$

$$\vec{r}_4 = \left(-\frac{l}{2}\right)\hat{x}_v + \left(\frac{b}{2}\right)\hat{y}_v$$

and

$$\vec{r} = |\vec{r}|\left(\sin(\alpha)\,\hat{x}_v + \cos(\alpha)\,\hat{y}_v\right)$$

So,

$$W_1' = \left[\left(\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{x}_v + \left[\left(-\frac{b}{2}\right) - r\cos(\alpha)\right]$$

$$W_2' = \left[\left(-\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{x}_v + \left[\left(-\frac{b}{2}\right) - r\cos(\alpha)\right]$$

$$W_3' = \left[\left(\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{x}_v + \left[\left(\frac{b}{2}\right) - r\cos(\alpha)\right]$$

$$W_4 = \left[\left(-\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{x}_v + \left[\left(\frac{b}{2}\right) - r\cos(\alpha)\right]$$

Now, Rotate W_i' by 90° to get W_i.

$$W_1' = \left[\left(\frac{b}{2}\right) + r\cos(\alpha)\right]\hat{x}_v + \left[\left(\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{y}_v$$

$$W_2' = \left[\left(\frac{b}{2}\right) + r\cos(\alpha)\right]\hat{x}_v + \left[\left(-\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{y}_v$$

$$W_3' = \left[\left(-\frac{b}{2}\right) + r\cos(\alpha)\right]\hat{x}_v + \left[\left(\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{y}_v$$

$$W_4 = \left[\left(-\frac{b}{2}\right) + r\cos(\alpha)\right]\hat{x}_v + \left[\left(-\frac{l}{2}\right) - r\sin(\alpha)\right]\hat{y}_v$$

$$\tan(\theta_1) = \frac{l - 2r\sin(\alpha)}{b + 2r\cos(\alpha)}$$

$$\tan(\theta_2) = \frac{-l - 2r\sin(\alpha)}{b + 2r\cos(\alpha)}$$

$$\tan(\theta_3) = \frac{l - 2r\sin(\alpha)}{-b + 2r\cos(\alpha)}$$

$$\tan(\theta_4) = \frac{-l - 2r\sin(\alpha)}{-b + 2r\cos(\alpha)}$$

Now,

$$\boxed{V_i = \frac{\omega}{|W_i|}}$$

$$\boxed{(rpm)_i = \left(\frac{V_i}{r_w}\right) \times \frac{60}{2\pi}}$$