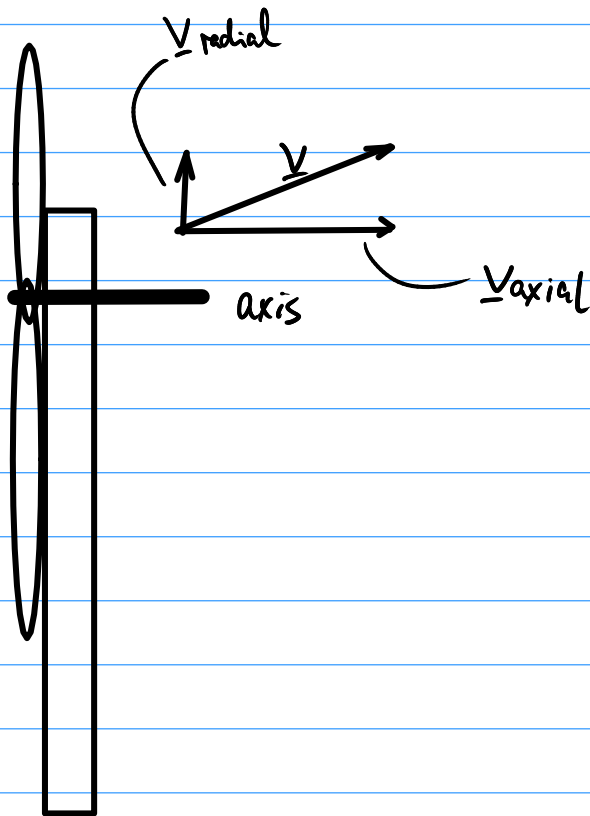


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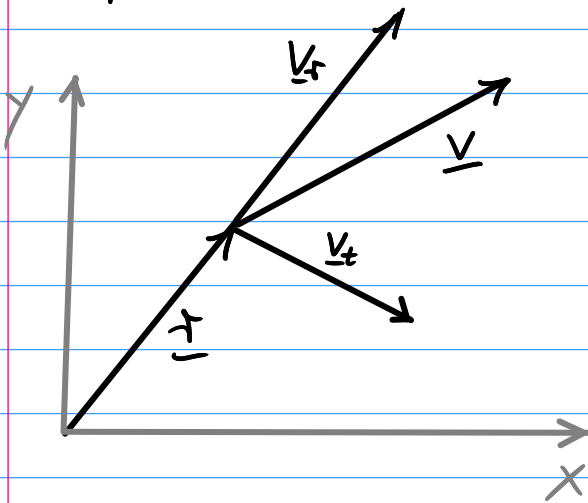
$$P = - \bar{F}_p \cdot u_w = - A \cdot \frac{\rho}{2} (u_{out}^2 - u_{in}^2) \frac{1}{2} (u_{out} + u_{in})$$

$$= - \frac{A \rho}{4} u_{in}^2 \left( + \frac{u_{out}^2}{u_{in}^2} - 1 \right) u_{in} \left( \frac{u_{out}}{u_{in}} + 1 \right)$$

$$= \frac{A \rho}{4} u_{in}^3 \left( - \frac{u_{out}^2}{u_{in}^2} + 1 \right) \left( \frac{u_{out}}{u_{in}} + 1 \right)$$

$$= \frac{A \rho}{4} u_{in}^3 \left( 1 - \frac{u_{out}^2}{u_{in}^2} \right) \left( 1 + \frac{u_{out}}{u_{in}} \right)$$

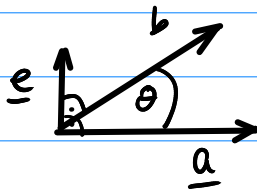
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$$\underline{r} \parallel \underline{u}$$

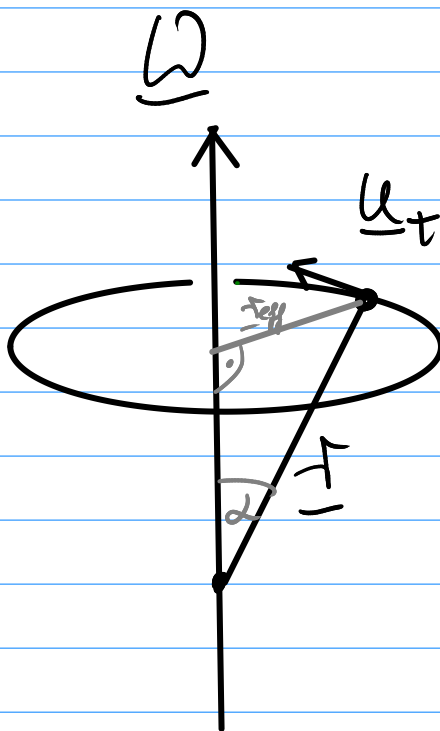
$$\begin{aligned}\underline{r} \times \underline{u} &= \underline{r} \times \underline{u}_{\parallel} + \underline{r} \times \underline{u}_{\perp} \\ &= \underline{r} \times \underline{u}_{\perp}\end{aligned}$$

$$\underline{a} \times \underline{b} = |\underline{a}| |\underline{b}| \sin \theta \underline{e}$$



$$\begin{aligned}\text{for } \underline{a} \parallel \underline{b} &\Rightarrow \theta = 0 \\ &\Rightarrow \sin \theta = 0\end{aligned}$$

$$\Rightarrow \underline{a} \times \underline{b} = \underline{0} \text{ for } \underline{a} \parallel \underline{b}$$



$$\underline{u}_t = \underline{\omega} \times \underline{r}$$

$$r_{\perp} = r \sin(\alpha)$$