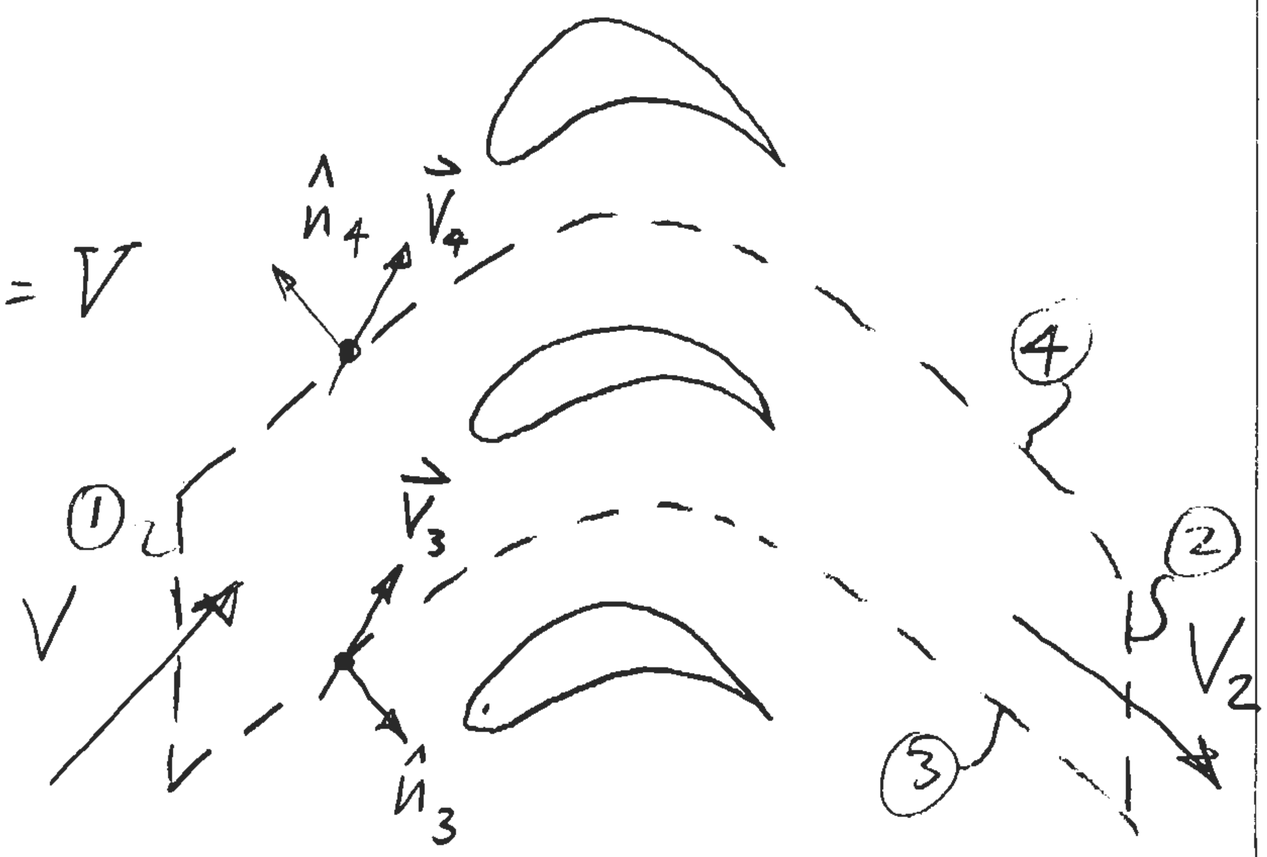
Control Volume:

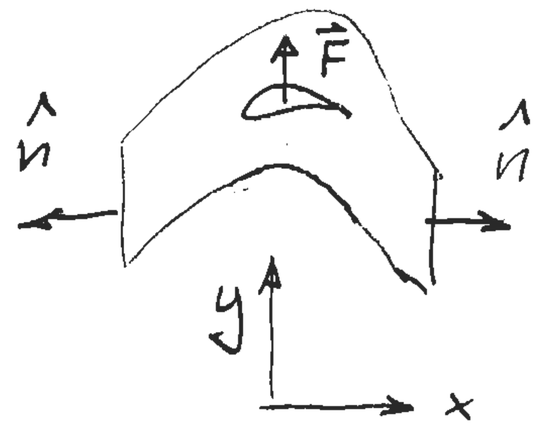


By mass conservation, $V_2 = V$

Because flow is periodic, $\vec{V}_3 = \vec{V}_4$, $p_3 = p_4$
And since $\hat{n}_4 = -\hat{n}_3$, then sides ③ and ④ will cancel in momentum integral.

$$\oint_{①} \left(p\hat{n} + \rho \vec{V}\cdot\hat{n}\,\vec{V}\right) dA + \oint_{②} \left(p\hat{n} + \rho \vec{V}\cdot\hat{n}\,\vec{V}\right) dA = -\vec{F}$$

By symmetry, $\oint_{①} p\hat{n}\, dA + \oint_{②} p\hat{n}\, dA = 0$



$$\oint_{①} \left(\rho \vec{V}\cdot\hat{n}\,\vec{V}\right) dA + \oint \rho \vec{V}\cdot\hat{n}\,\vec{V}\, dA = -\vec{F}$$

$$-\rho V \frac{\sqrt{2}}{2} \cdot V \begin{bmatrix} \sqrt{2}/2 \\ \sqrt{2}/2 \end{bmatrix} h + \rho V \frac{\sqrt{2}}{2} \cdot V \begin{bmatrix} -\sqrt{2}/2 \\ -\sqrt{2}/2 \end{bmatrix} = -\vec{F}$$

$$\boxed{\vec{F} = \begin{bmatrix} 0 \\ \rho V^2 h \end{bmatrix} \quad \text{Vertical Force}}$$