Review

flow over a flate plate.

Boundary layer

laminar

$Re_x \leq 3.2 * 10^5$

$x \leq 3.2 * 10^5 \frac{\mu}{\rho u_\infty}$

$$\frac{\delta}{x} = \frac{4.79}{\sqrt{Re_x}} \quad (8.16)$$

$$C_f = \frac{\tau_w}{\frac{1}{2}\rho u_\infty^2} = \frac{0.656}{\sqrt{Re_x}} \quad (8.17)$$

turbulent

$Re_x > 3.2 * 10^5$

$x > 3.2 * 10^5 \frac{\mu}{\rho u_\infty}$

$$\frac{\delta}{x} = \frac{0.376}{(Re_x)^{1/5}} \quad (8.61)$$

$$C_f = \frac{\tau_w}{\frac{1}{2}\rho u_\infty^2} = \frac{0.0576}{(Re_x)^{1/5}} \quad (8.62)$$

$$F_D = \int \tau_w \, dA \quad \& \; dA = dx \left(\frac{\text{area}}{\text{unit width}}\right)$$

To solve a problem

first check if the whole B.L is laminar or not

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