

$$\tau_w = \mu \frac{U_o}{\delta} = \mu \frac{U_o}{\sqrt{\frac{12 \mu x}{\rho U_o}}}$$

$$C_f = \frac{\tau_w}{\frac{1}{2} \rho U_o^2}$$

$$\theta = \int_0^{\delta} \frac{u}{U_o} \left(1 - \frac{u}{U_o}\right) dy = \int_0^{\delta} \left(\frac{y}{\delta}\right) \left(1 - \frac{y}{\delta}\right) dy$$

$$= \delta \int_0^1 \left(\frac{y}{\delta}\right) \left(1 - \frac{y}{\delta}\right) d\frac{y}{\delta}$$

$$= \delta \left(\frac{1}{2} - \frac{1}{3}\right) = \frac{\delta}{3} = \frac{1}{5} \sqrt{\frac{12 \mu x}{\rho U_o}}$$