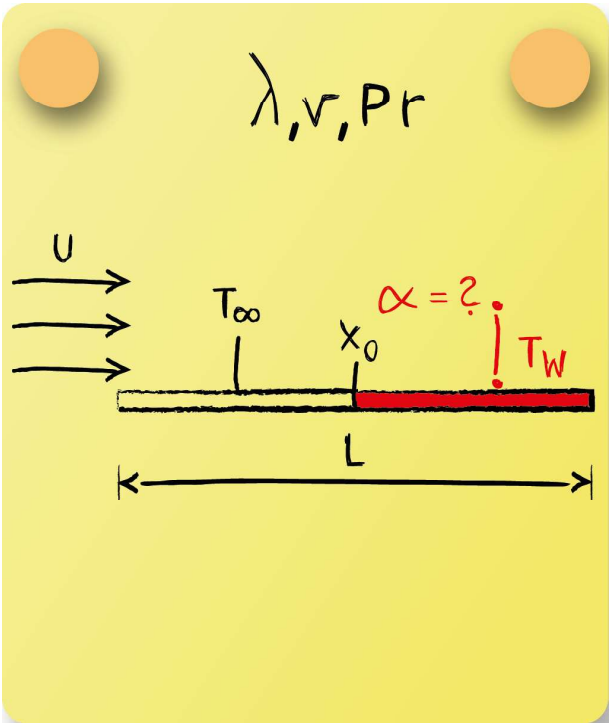
Heat Transfer Correlation 3.5



A fluid streams over a flat plate. The plate is heated from x_0. Calculate the mean heat transfer coefficient $\bar{\alpha}$.

Reynolds number:

$$\mathrm{Re_L} = \frac{u \cdot L}{\nu} = 6.52 \cdot 10^4$$

Nusselt number:

$$\overline{\mathrm{Nu_L}} = 0.664 \cdot \mathrm{Re_L}^{\frac{1}{2}} \cdot \mathrm{Pr}^{\frac{1}{3}} \frac{\left[1 - \left(\frac{x_0}{L}\right)^{\frac{3}{4}}\right]^{\frac{2}{3}}}{\left[1 - \frac{x_0}{L}\right]} = 166.01$$

Heat transfer coefficient:

$$\bar{\alpha} = \frac{\overline{\mathrm{Nu_L}} \cdot \lambda_\mathrm{f}}{L} = 0.85 \ \mathrm{W/m^2K}$$