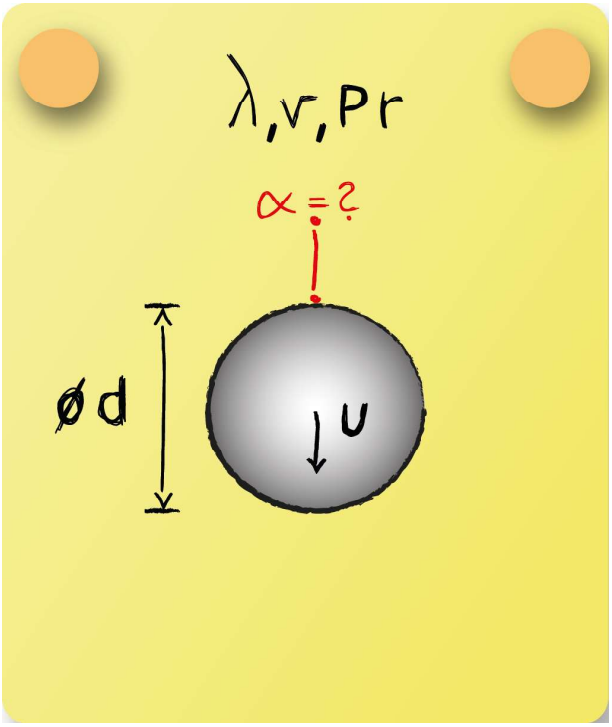
Heat Transfer Correlation 11.3



A sphere falls through a non-moving fluid. Calculate the mean heat transfer coefficient $\bar{\alpha}$.

Reynolds number:

$$\mathrm{Re_d} = \frac{u \cdot d}{\nu} = 2.79 \cdot 10^4$$

Nusselt number:

$$\overline{\mathrm{Nu_d}} = 2 + \left(0.4 \cdot \mathrm{Re_d}^{\frac{1}{2}} + 0.06 \cdot \mathrm{Re_d}^{\frac{2}{3}}\right) \cdot \mathrm{Pr}^{0.4} \cdot \left(\frac{\eta_\infty}{\eta_\mathrm{w}}\right)^{\frac{1}{4}} = 347.25$$

Heat transfer coefficient:

$$\bar{\alpha} = \frac{\overline{\mathrm{Nu_d}} \cdot \lambda_\mathrm{f}}{d} = 1948.08 \ \mathrm{W/m^2K}$$