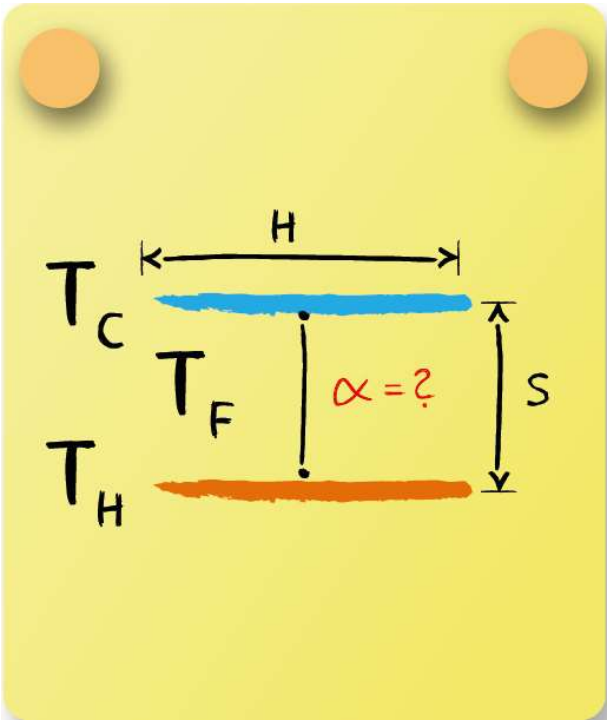
Heat Transfer Correlation 22.2



A gap between two horizontal plates is filled with an ideal gas. Calculate the mean heat transfer coefficient $\bar{\alpha}$ on the upper surface.

Coefficient of volume expansion for an ideal gas:

$$\beta = \frac{1}{T_\mathrm{F}} = 0.0031 \ \mathrm{K}^{-1}$$

And thus:

$$\mathrm{Gr_s} \cdot \mathrm{Pr} = \frac{g \cdot \beta \cdot (T_\mathrm{H} - T_\mathrm{C}) \cdot s^3}{\nu^2} \cdot \mathrm{Pr} = 691.11$$

Nusselt number:

$$\overline{\mathrm{Nu_s}} = 1$$

Heat transfer coefficient:

$$\bar{\alpha} = \frac{\overline{\mathrm{Nu_s}} \cdot \lambda_\mathrm{f}}{s} = 6.67 \ \mathrm{W/m^2K}$$