Glossary

- Steady-state conditions imply that time has no influence on the temperature distribution within an object, although temperature may be different at different locations within the object.

- Under unsteady-state conditions, the temperature changes with location and time.

- Conductive heat transfer in a rectangular slab is given by

- $q_x = \dfrac{(T_1 - T_2)}{\left[\dfrac{(x_2 - x_1)}{kA}\right]}$ for

  The boundary conditions are
  $x = x_1$; $T = T_1$
  $x = x_2$; $T = T_2$

- Thermal resistance may be expressed as

$$R_t = \frac{(x_2 - x_1)}{kA}$$

- Conductive heat transfer through a tubular pipe is given by

$$q_r = \frac{2\pi Lk(T_i - T_o)}{\ln(r_o/r_i)}$$

For boundary conditions

$T = T_i$; $r = r_i$
$T = T_o$; $r = r_o$

- Thermal resistance is given by

$$R_t = \left[\frac{\ln(r_o/r_i)}{2\pi Lk}\right]$$

- $\dfrac{hl}{k} = N_{Nu}$, Nusselt number

- $N_{\mathrm{Pr}} = \dfrac{\text{Kinematic viscosity}}{\text{Thermal diffusivity}} = \dfrac{\nu}{\alpha} = \dfrac{\mu c_p}{k}$

- For heating of fluid with electrically heated pipe surface, a graphical relationship may be conveniently expressed with an equation as

$$N_{Nu} = CN_{\mathrm{Re}}^{m} N_{\mathrm{Pr}}^{n}$$

- Rayleigh number, $N_{Ra} = N_{Gr} \times N_{\mathrm{Pr}}$

- A Grashof number, N_{Gr} is a ratio between the buoyancy forces and viscous forces. Similar to the Reynolds number, the Grashof number is useful for determining whether a flow over an object is laminar or turbulent.

- LMTD, $\Delta T_{lm} = \dfrac{\Delta \mathrm{T}_2 - \Delta \mathrm{T}_1}{\ln\left(\dfrac{\Delta \mathrm{T}_2}{\Delta \mathrm{T}_1}\right)}$