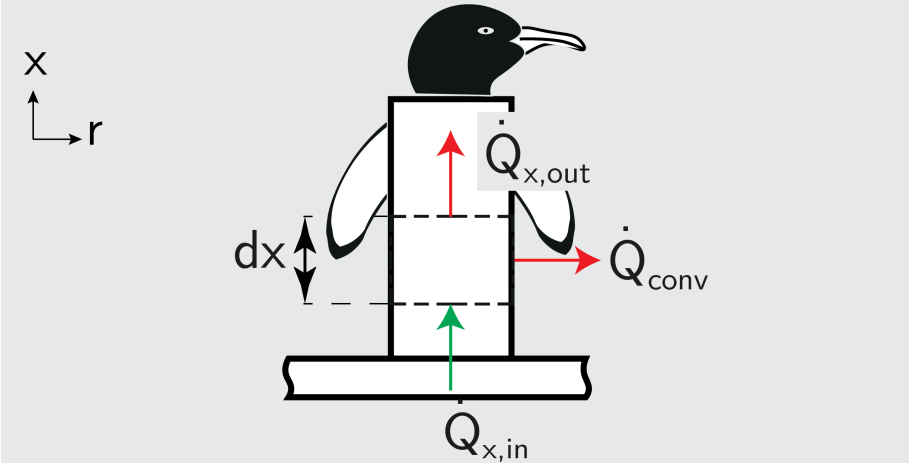
Boundary Conditions - Cond. - IE 11

Define the boundary conditions needed for solving the given heat conduction equation which yields the axial temperature distribution for the body of a penguin. Assume one-dimensional, steady-state heat transfer in the x-direction with no sources/sinks.



Given the differential equation:

$$0 = \frac{\partial^2 \Theta}{\partial x^2} - m^2 \Theta$$

Homogenization parameters:

$$\Theta = T(x) - T_\infty$$

$$m^2 = \frac{2 \cdot \alpha}{\lambda \cdot R}$$

Boundary Conditions:

$$\Theta(x = 0) = T_B - T_\infty$$

$$\Theta(x = L) = T_H - T_\infty$$

The first boundary condition results from the fact that $T(x = 0) = T_\mathrm{B}$ and the second one from the fact that $T(x = L) = T_\mathrm{H}$.