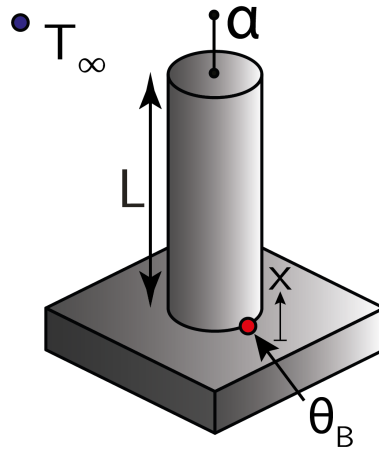


Fins - Boundary Conditions 3

Choose the right boundary condition at the tip $x = L$ for a fin, that loses heat due to convection at the tip, for solving the fin equation.



Given the fin equation:

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

Where:

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

It is known that the head is still losing heat due to convection. This can be stated as follows:

$$\dot{Q} = -\lambda A_c \frac{\partial T}{\partial x} \Big|_{x=L} = -\lambda A_c \frac{\partial \theta}{\partial x} \Big|_{x=L} = \alpha A_c (T(x=L) - T_\infty)$$

Where rewriting yields:

$$\rightarrow \frac{\partial \theta}{\partial x} \Big|_{x=L} = -\frac{\alpha}{\lambda} \theta(x=L)$$