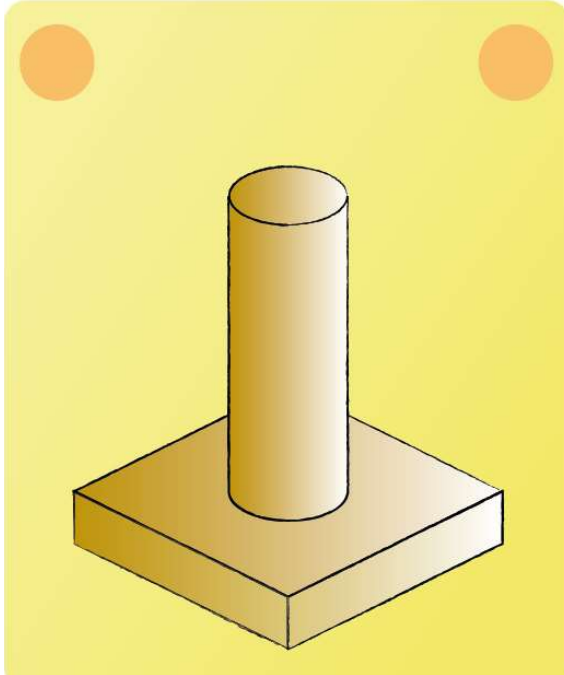


Lecture 11 - Question 5



One of the possible solutions for the homogeneous differential equations for fins is $\theta(x) = A \cdot \sinh(m \cdot x) + B \cdot \cosh(m \cdot x)$. Consider an infinitely long fin with a known base temperature T_B in a surrounding fluid with a temperature T_A . Which two boundary conditions can be **directly** used for determining coefficients A and B?

$$\theta(0) = T_B - T_A$$

Describes directly that the temperature difference between the surface temperature $T(x)$ at $x=0$ and the ambient temperature T_A is the difference between the base temperature T_B and ambient temperature T_A . Which is a result from the fact that the surface temperature at $x=0$ equals the base temperature $T(0) = T_B$.



$$\left. \frac{d\theta}{dx} \right|_{x=L} = 0$$

Describes directly that, due to the fact that the fin is infinitely long, no heat exchange will take place at $x=L$. Therefore the gradient of the temperature difference between the surface temperature $T(x)$ at $x=L$ and the ambient temperature T_A is zero. Which is a result from the fact that the surface temperature gradient at $x=L$ approaches zero $\left. \frac{dT}{dx} \right|_{x=L} = 0$