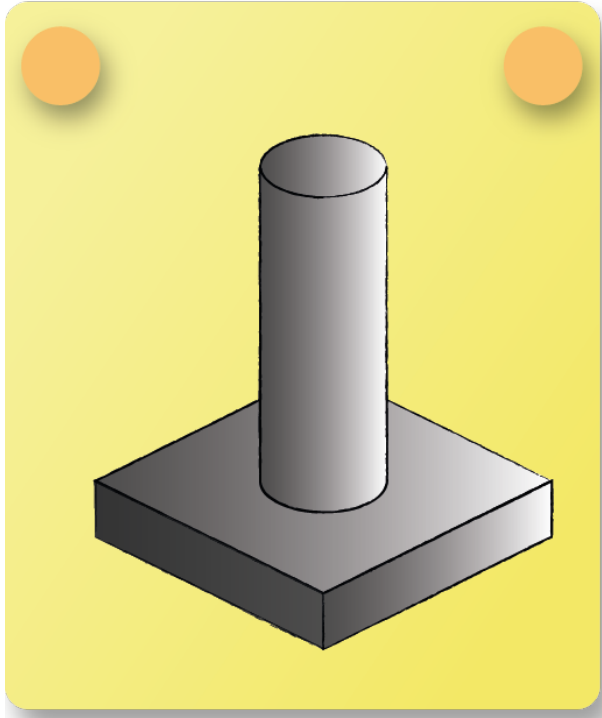# Lecture Conduction Biot Number 1

Why is the Biot number important to the solution of fin type problems?

The Biot Number is defined as the ratio of thermal resistances inside a body and the body's surface:

$$\mathrm{Bi} = \frac{W_{\mathrm{conductive}}}{W_{\mathrm{convective}}} = \frac{\alpha L}{\lambda}$$

With L representing a characteristic length of the body. In case of a pin fin the only direction where both mechanisms take part in the heat transfer is radial and hence, the characteristic length is chosen to be the fin's radius. The one-dimensional fin equation requires the temperature profile to be constant in radial direction within the fin. This assumption is valid, if thermal resistance inside the body is small compared to thermal resistance at the body's surface, which implies a small Biot number: $\mathrm{Bi} \ll 1$.