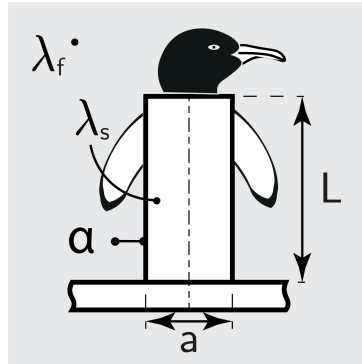


Biot Number 04

The body of a penguin can be simplified to a long cylinder with a 1-dimensional temperature profile in the axial direction. This is valid for $Bi \ll 1$. Give an expression for the Biot number in terms of given variables.



The standard expression for the Biot number is:

$$Bi = \frac{\alpha L_c}{\lambda_s}$$

The characteristic length in the given situation should be determined.

In this case, the characteristic length is:

$$L_c = \frac{V}{A_s} = \frac{\frac{\pi a^2 L}{4}}{\pi a L} = \frac{a}{4}$$

With this finding, the Biot number in the given situation can be expressed as:

$$Bi = \frac{\alpha a}{4\lambda_s}$$