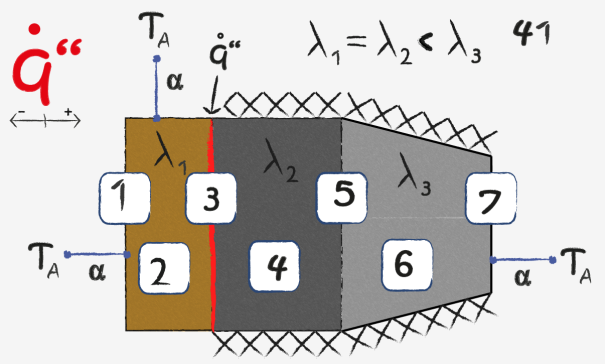
Axial Heat Flux: Task 41



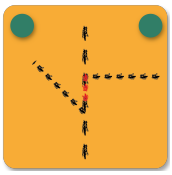
The image describes a body consisting of three sections. Section 1 is a fin with a planar heat source at the transition to section 2. Section 2 and 3 are adiabatic at the bottom and top walls. The cross section area of section 3 decreases linearly and the right boundary is convective.

1

The convective boundary at the left yields a negative specific heat flux. The slope is due to convection at bottom and top surfaces.

2

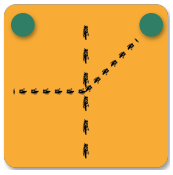
Convective walls cause the absolute specific heat flux to rise towards the heat source. Also the gradient gets steeper, since it goes along with a higher temperature, meaning higher convective heat losses.

3 

Since ambient temperature is equal at any convective boundary, heat is partly conducted through section 1 and sections 2 and 3. Therefore the jump of specific heat flux at the transition is from negative to positive.

4

Cross section is constant and no source or sink terms are present, hence the specific heat flux is conserved in this section.

5 

The transition is characterized by a kink in specific heat flux, since cross section area is decreasing in section 3.

6

As area decreases linearly towards the right, specific heat flux rises with increasing gradient.

7

Heat flux at the right is positive increasing due the mentioned behavior in section 3.