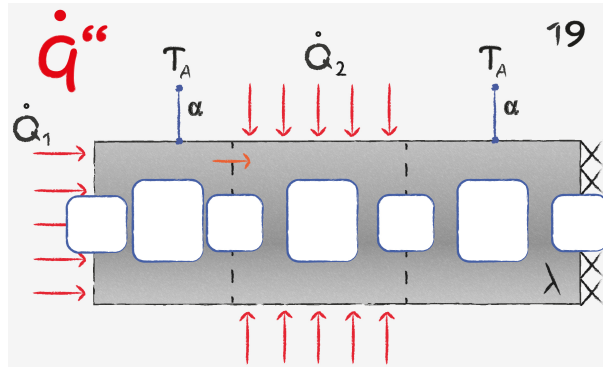


Axial Heat Flux: Task 19



The image describes a rectangular body with imposed heat fluxes on the left and the center. The arrow indicates the direction of the heat flux at the transition. The wall on the right side is adiabatic and there is a heat loss through convection in the right and left section.

1



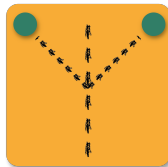
The imposed heat flux yields a positive profile.

2



Due to convection the heat flux decreases and remains positive to fulfill the given direction at the transition. As temperature decreases, the slope's amount does so too.

3



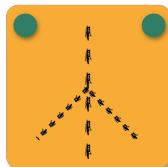
The transition is characterized by a kink from decrease to increase, since it marks the end of convection and beginning of the imposed heat flux.

4



The imposed heat flux acts just as a volumetric heat source. To meet the given direction of heat flow at the transition of section 1 to section 2, it is necessary that heat is conducted only to the right, yielding a linearly increasing positive profile.

5



From section 2 to section 3 boundary conditions change to convective, which causes the specific heat flux to decrease.

6



The slope increases, meaning that due to decreasing temperature difference, less heat is transferred by convection towards the right side.

7



Heat flux decreases due to convection and vanishes at the adiabatic boundary.