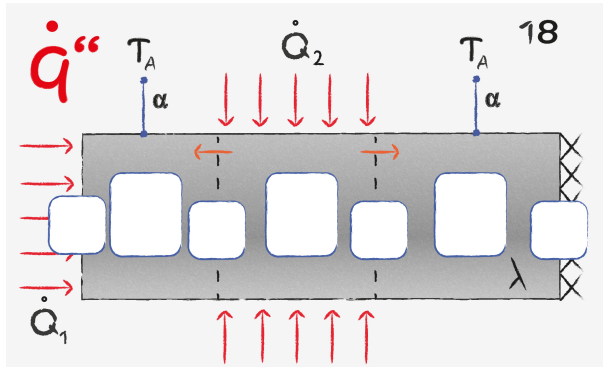
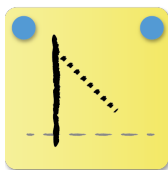


Axial Heat Flux: Task 18



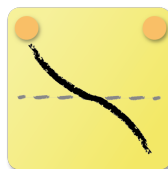
The image describes a rectangular body with imposed heat fluxes on the left and the center. Arrows at the transitions indicate the direction of the heat flux. The wall on the right side is adiabatic and there is a heat loss through convection in the right and left section.

1



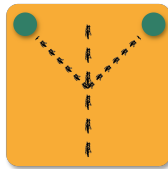
The imposed heat flux yields a positive profile.

2



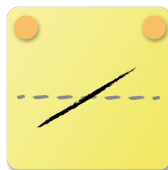
Due to convection the heat flux decreases and changes into negative to fulfill the given direction at the transition. The slope's amount is minimal where the specific heat flux vanishes, since temperature reaches it's local minimal at this point.

3



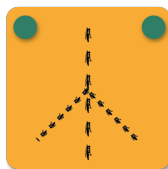
The transition is characterized by a kink from decrease to increase, since it marks the end of convection and beginning of the imposed heat flux.

4



The imposed heat flux acts just as a volumetric heat source. To meet the given directions of heat flow at the transitions of section 2, it is necessary that heat is conducted partly to the left and the right, yielding a linearly increasing profile from negative to positive.

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.