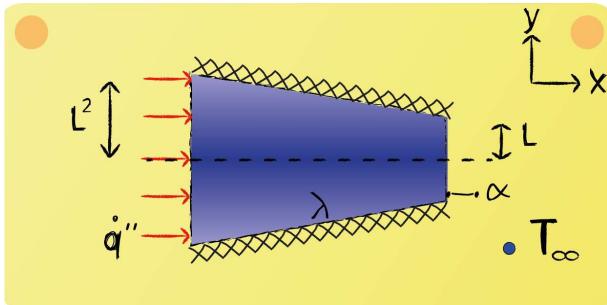


## Lecture 6 - Question 8



A constant heat flux is entering a truncated cone. At the same time it is losing the same amount of heat due to convection. The sides are covered with an adiabatic wall. The temperature of the cone  $T_w$  can be assumed to be homogeneous. Derive an energy balance to determine the temperature of the cone  $T_w$ .

**Energy balance:**

$$\dot{Q}_{x,in} - \dot{Q}_{x,out} = 0$$

The sum of the in- and outgoing heat fluxes of the control volume should equal zero, because of steady-state conditions.



**Heat fluxes:**

$$\dot{Q}_{in} = \dot{q}'' \pi L^4$$

$$\dot{Q}_{out} = \alpha \pi L^2 (T_w - T_\infty)$$