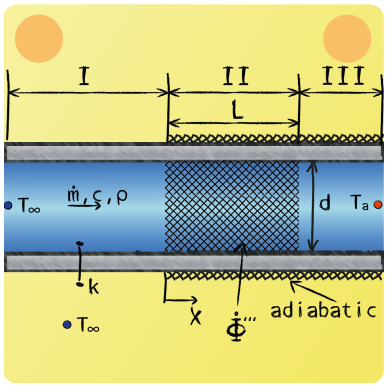
Lecture 7 Question 6

Water flows through a long tube which has adiabatic walls from a certain location $x = 0$. The area upstream of $x = 0$ is named region I. Between the point $x = 0$, and $x = L$ (region II) a very fine-meshed, electrically heated grid is located in the flow. Well ahead of the grid, the flow has the ambient temperature T_∞ and downstream of the grid, the temperature T_a.
Pick the boundary and coupling conditions that are applicable with consideration of the diffusive heat transport



Conditions:

$$lim_{x\to-\infty} T_{\mathrm{I}}(x) = T_\infty$$

$$\lim_{x\to-\infty} \frac{dT_{\mathrm{I}}}{dx} = 0$$

$$T_{\mathrm{I}}(x = 0) = T_{\mathrm{II}}(x = 0)$$

$$T_{\mathrm{II}}(x = L) = T_{\mathrm{a}}$$

$$\frac{dT_{\mathrm{I}}}{dx}|_{x=0} = \frac{dT_{\mathrm{II}}}{dx}|_{x=0}$$

$$\frac{dT_{\mathrm{II}}}{dx}|_{x=L} = 0$$