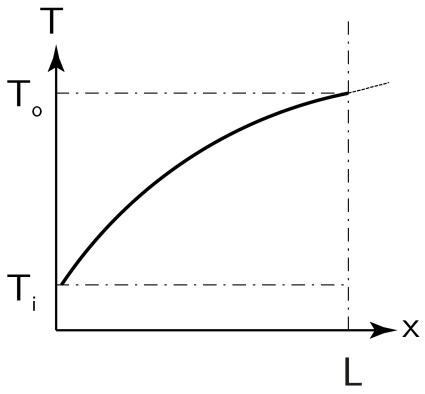
# Temperature Profile - Internal Convection 02

**Water flows through a pipe of length $L$ and it is heated from temperature $T_\mathrm{i}$ to $T_\mathrm{o}$. Heat transfer is driven by convection: the pipe is heated by a transverse fluid flow at temperature $T_\mathrm{A}$ with velocity $u$. With: $T_\mathrm{A} > T_\mathrm{o}$ . Sketch the expected water temperature profile along the axis of the pipe.**




Water enters at a temperature $T_\mathrm{i}$.

From the entrance, it is being heated due to convectional heat transfer. As the temperature difference between the fluid temperature and ambient temperature gets smaller, less heat is transferred toward the water and therefore the slope decreases gradually.

Eventually the water leaves the system at a temperature $T_\mathrm{o}$, but the slope is not horizontal due to the fact that $T_\mathrm{A} > T_\mathrm{o}$ and still heat is being transferred towards the water at that position.