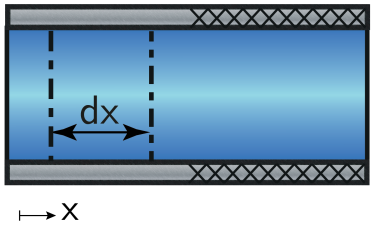
Control Volume - Conv. - I.E. 4

Through a very long pipe with diameter D flows a fluid. The first half of the pipe is being heated with a constant rate $\dot{q}''$. The second half of the pipe is fully adiabatic.

Pick the correct control volume for setting up the energy balance to calculate the temperature profile of the fluid in the flow direction in the first segment of the pipe. If needed, also define the coordinate system.



Defining the domain:

The temperature profile in the flow direction needs to be determined for the segment of the pipe. The temperature profile can be derived from setting up the energy balance of an infinitesimal element in the flow direction in the first segment of the pipe and defining its boundary and/or initial conditions. Therefore an energy balance around the drawn infinitesimal element with the flow direction being parallel to the x-direction is suitable.