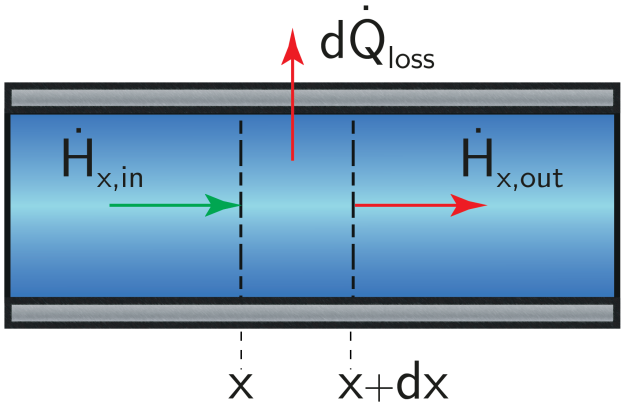
nBC - Conv. - IE 3

Through a very long pipe with diameter D flows a fluid. In addition, the pipe has a uniform, constant wall temperature T_w.

How many boundary conditions are required to solve its differential equation and find an expression for the temperature profile in the flow direction?



Given the differential equation:

$$0 = -u\rho c D\frac{\partial T}{\partial x} - 4\alpha\left(T - T_\mathrm{w}\right)$$

From the differential condition, it can be seen that the fluid temperature T has been differentiated once with respect to x. Therefore, the integration will lead to one integration constant, and to find an expression for this constant one boundary condition is required.