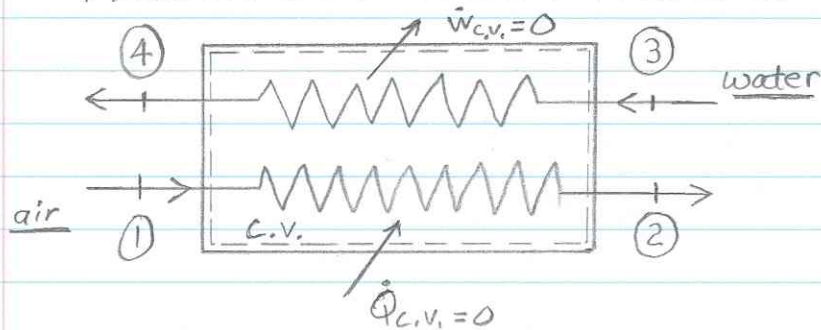


Example: Problem 6.85, Heat Exchanger

- purpose: to transfer heat from one fluid stream to another fluid stream



Assumptions:

1. Steady state, steady flow
2. $\dot{W}_{C.V.} = 0$
3. $\Delta P, E_i = 0$
4. $\Delta KE = 0$
5. $\dot{Q}_{C.V.} = 0$

Heat exchanger is used to cool an air flow from 800 K to 360 K; pressure is 1 MPa.

The coolant is water flow at 15°C and 0.1 MPa.

The water leaves as a saturated vapor.

Determine $\frac{\dot{m}_{\text{water}}}{\dot{m}_{\text{air}}}$

Air side

$$P_1 = 1 \text{ MPa}$$

$$P_2 = 1 \text{ MPa}$$

$$T_1 = 800 \text{ K}$$

$$T_2 = 360 \text{ K}$$

Water side

$$P_3 = 0.1 \text{ MPa}$$

$$P_4 = 0.1 \text{ MPa}$$

$$T_3 = 15^\circ\text{C}$$

$$x_4 = 1$$