WEEK 1

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Task 1

A short summary about the conductive heat transfer and solving the same exercise with L= 0.4 m, A= 20 m2, Delta T= 25, and k=0.78 W/m K using both simple method and using the resistance concept.

Conduction

Thermal conduction is a heat propagation/exchange phenomenon due to the contact between particles without macroscopic displacement of matter. This is the only propagation/exchange modality which occurs within solids.

The basic law to describe the thermal conduction is the Fourier's law: this allows quantifying the thermal flux going through one square meter (surface unity) of a wall.

Thermal conductibility is a material property describing its capability to transmit heat for conduction.

It depends on the temperature and on the humidity content.

Calculation

Using simple method

$$\dot{Q} = kA\frac{\Delta T}{L} = 0.78 \ * 20 * \frac{25}{0.4} = 975\ W$$

Or, using resistance

$$R_{wall} = \frac{L}{kA} = \frac{0.4}{0.78 * 20} = 0.0256\ °C/W$$

$$\dot{Q} = \frac{\Delta T}{R_{Wall}} = \frac{25}{0.0256} = 976.5\ W$$