

Example 0

Conduction is the transfer of heat between substances that are in direct contact with each other. The better the conductor, the more rapidly heat will be transferred.

Consider steady-state heat transfer through the wall with thickness Δx where the wall inside is at higher temperature (T_h) compared with the outside wall (T_c). Heat transfer, \dot{Q} (W), is in the direction of x and perpendicular to the plane of temperature difference.

$$L = 0.4 \text{ m}, A = 20 \text{ m}^2, \Delta T = 25, \text{ and } k = 0.78 \text{ W/m K}$$

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

Let's solve it the harder way !!!

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

$$\dot{Q} = \frac{\Delta T}{R_{wall}} = \frac{25}{0.0256} = 976 \text{ W}$$

$$976 - 273 = 703 \text{ W/MC}$$