The heater wire in a small stove is made of iron ribbon wire 0.1 cm by 0.5 cm in rectangular cross-section and 2 m long. Calculate its resistance.

Solution.

The resistance is determined by the following formula:

$$R = \frac{\rho l}{S},$$

where $\rho = 9.71 \cdot 10^{8}\ \text{ohm} \cdot \text{m}$ is the resistivity of iron, $l = 2\ \text{m}$ is the length of the wire, S is the cross-section area. Find S knowing that the cross-section is rectangular:

$$S = 0.1 \cdot 0.5 = 0.05\ \text{cm}^2 = 5 \cdot 10^{-6}\ \text{m}^2.$$

So we can find the resistance as follows:

$$R = \frac{9.71 \cdot 10^{-8} \cdot 2}{5 \cdot 10^{-6}} = 0.039\ \text{ohm}.$$

Answer: $0.039\ \text{ohm}$.