Calculate the resistance of 1km long copper wire of radius 1mm

Solution:

The resistance of wire

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

where ρ - resistivity of the material (for copper is 0.017 Ohm*mm²/m at the temperature of 20 °C);

l – length of wire;

$S = \pi r^2$ – cross-sectional area of wire, where r – radius of wire[i].

$$R = 0.017 \frac{1000}{3.14 \cdot 1^2} = 5.41 \; Ohm.$$

Answer: 5.41 Ohm at the temperature of 20 °C