2. Heat flux (4 points)

Heat resistivity is equal to the ratio of the temperature difference between the end-points of a wire of unit cross-section and unit length, and the heat flux (unit: W) through this wire.

1) Microprocessor of power $P = 90\,\text{W}$ has a water-cooling system. The chip and flowing water are separated by a copper plate of thickness $d = 5\,\text{mm}$ and cross-section area $s = 100\,\text{mm}^2$. What is the temperature difference between the processor and water? The copper heat resistivity is $\rho = 2{,}6\,\text{mm} \cdot \text{K/W}$.

2) A wire is made of different alloys, its heat resistivity ρ as a function of the coordinate along the wire is given in the attached graph. The cross-section area of the wire is $S = 1\,\text{mm}^2$, its length $l = 4\,\text{cm}$. Find the heat flux through the wire, if one end of the wire is kept at the temperature 100°C, and the other end — at 0°C.

