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قسم :الهندسة الكهربائية

Tutorial 05

Exercise 01:

To heat a room, a cylindrical radiator with a diameter D=2 cm and length L=0.5 cm is used. The radiator behaves as a blackbody and emits a power of 1 kW. Convection and conduction heat transfers are negligible.

1. Calculate the temperature of the radiator.
2. Determine the wavelength at which the spectral energy density emitted by the radiator is maximum.
3. What should the radiator's temperature be for this wavelength to be 2 μm? What would then be the power emitted?

   Given: Stefan-Boltzmann constant $\boldsymbol{\sigma} = 5.67\times10^{-8}\ W\cdot m^{-2}\cdot K^{-4}$.

Exercise 02:

After sunset, a person standing nearby can sense the energy radiated by a brick wall. Such a wall often has a temperature of 45°C and an emissivity of approximately 0.9.

1. What is the radiated thermal flux per unit area from such a wall?
2. What is the wavelength corresponding to the maximum radiated energy?
3. What type of radiation is this?