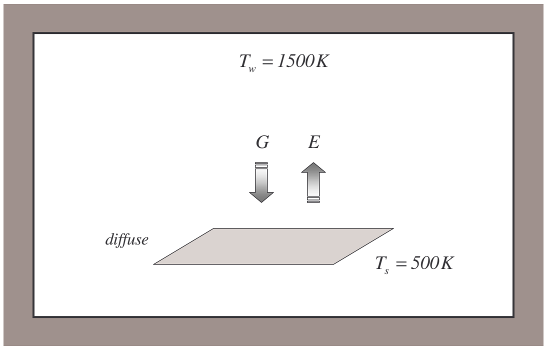
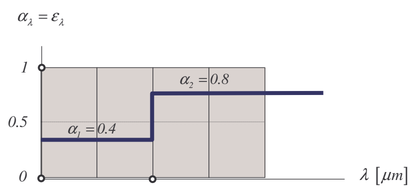
12.68

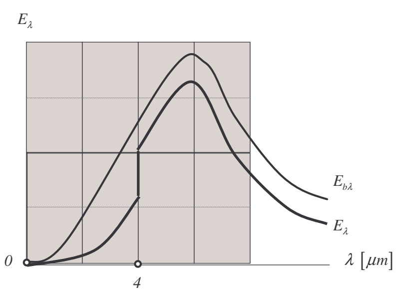


a



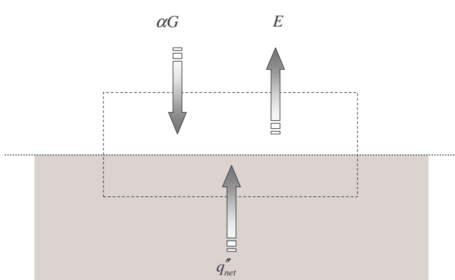
$$\varepsilon = \alpha_1 \cdot F_{0\to 4}(T_s) + \alpha_2 \cdot \left[1 - F_{0\to 4}(T_s)\right] = (0.4)\cdot(0.0677) + (0.8)\cdot\left[1 - 0.0677\right] = 0.77$$

$$\alpha = \alpha_1 \cdot F_{0\to 4}(T_w) + \alpha_2 \cdot \left[1 - F_{0\to 4}(T_w)\right] = (0.4)\cdot(0.7378) + (0.8)\cdot\left[1 - 0.7378\right] = 0.51$$



$$E_\lambda = \varepsilon_\lambda E_{b\lambda} = \begin{cases} \varepsilon_1 E_{b\lambda} & 0 \le \lambda \le 4 \\ \varepsilon_2 E_{b\lambda} & \lambda > 4 \end{cases}$$

b



$$q''_{rad,net} = E - \alpha G = \varepsilon E_b - \alpha G$$

$$q''_{rad,net} = \sigma\left[\varepsilon T_s^4 - \alpha T_w^4\right]$$

$$= (5.67e-8)\left[(0.29)(500)^4 - (0.51)(1500)^4\right]$$

$$= -142{,}000\left[\frac{W}{m^2}\right]$$

to the surface

surface is heated

to maintain steady state heat has to be removed from the surface

$$q''_{rad,net} = -142{,}000\left[\frac{W}{m^2}\right]$$