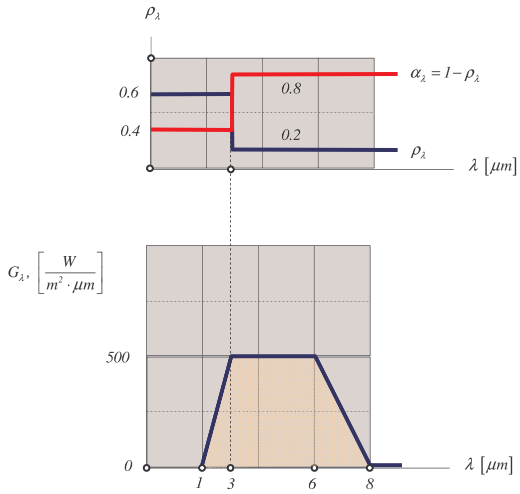
12.69



$$\varepsilon = \alpha_1\cdot F_{0\to4}(T_s)+\alpha_2\cdot\left[1 - F_{0\to4}(T_s)\right] = (0.4)\cdot(01103)+(0.8)\cdot[1 - 0.1103] = 0.76$$

$$G = \int_0^\infty G_\lambda\,d\lambda = \int_1^3 G_\lambda d\lambda+\int_3^6 G_\lambda d\lambda+\int_6^8 G_\lambda d\lambda+\int_8^\infty G_\lambda d\lambda$$

$$= \frac{500\cdot2}{2}+\frac{500\cdot3}{1}+\frac{500\cdot2}{2}+0$$

$$= 2500\ \left[\frac{W}{m^2}\right]$$

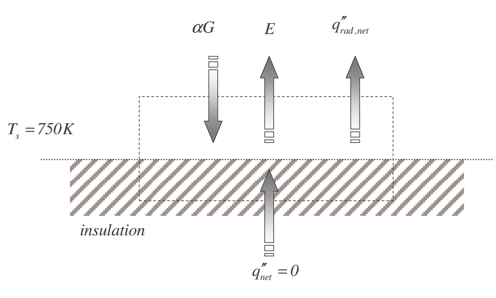
$$G_{abs} = \int_0^\infty G_{\lambda,abs}\,d\lambda = \int_0^\infty \alpha_\lambda G_\lambda d\lambda = \int_1^3 \alpha_\lambda G_\lambda d\lambda+\int_3^6 \alpha_\lambda G_\lambda d\lambda+\int_6^8 \alpha_\lambda G_\lambda d\lambda+\int_8^\infty \alpha_\lambda G_\lambda d\lambda$$

$$= 0.4\int_1^3 G_\lambda d\lambda+0.8\int_3^6 G_\lambda d\lambda+0.8\int_6^8 G_\lambda d\lambda+0.8\int_8^\infty G_\lambda d\lambda$$

$$= 0.4\cdot\frac{500\cdot2}{2}+0.8\cdot\frac{500\cdot3}{1}+0.8\cdot\frac{500\cdot2}{2}+0.8\cdot0$$

$$= 1800\ \left[\frac{W}{m^2}\right]$$

$$\alpha = \frac{G_{abs}}{G} = \frac{1800}{2500} = 0.72$$



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

$$= (0.76)(5.67e-8)(750)^4 - (0.72)(2500) = 11{,}800\ \left[\frac{W}{m^2}\right]$$

The net radiative flux is chosen to be positive from the surface. Result is positive, that means that the net radiative flux is from the surface

(at this moment, the surface emitts more radiation than it absorbs incident radiation)