$t_1 := \text{time}(0)$

$\mu\text{rad} \equiv 10^{-6}\cdot\text{rad}$ $\quad$ $\text{mrad} \equiv 10^{-3}\cdot\text{rad}$ $\quad$ $\mu\text{m} \equiv 10^{-6}\text{m}$ $\quad$ $\text{nm} := 10^{-9}\text{m}$

$\text{ms} \equiv 10^{-3}\cdot\text{s}$ $\quad$ $\mu\text{s} \equiv 10^{-6}\text{s}$ $\quad$ $\text{ns} \equiv 10^{-9}\cdot\text{s}$ $\quad$ $\text{kt} \equiv 1852\,\frac{\text{m}}{\text{hr}}$ $\quad$ $\text{nmi} := 1852\cdot\text{m}$ $\quad$ $°\text{C} \equiv \text{K}$

$c \equiv 2.99792458\cdot 10^{8}\,\frac{\text{m}}{\text{s}}$ $\quad$ $h \equiv 6.62606876\cdot 10^{-34}\text{J}\cdot\text{s}$ $\quad$ $r_e \equiv 6378140\cdot\text{m}$ $\quad$ $\sigma \equiv 5.670400\cdot 10^{-8}\cdot\frac{\text{watt}}{\text{m}^2\cdot\text{K}^4}$

$\text{mJ} \equiv 10^{-3}\text{J}$ $\quad$ $\text{MW} \equiv 10^{6}\text{W}$ $\quad$ $\text{nW} \equiv 10^{-9}\text{W}$ $\quad$ $\mu\text{W} \equiv 10^{-6}\text{W}$ $\quad$ $\text{mW} \equiv 10^{-3}\text{W}$ $\quad$ $\text{time}(0) - t_1 = 0.0940$

brick $\quad$ brick $\quad$ insulation $\quad$ steel

$\text{thk}_4 := 270\text{mm}$ $\quad$ $\text{thk}_3 := 70\text{mm}$ $\quad$ $\text{thk}_2 := 10\text{mm}$ $\quad$ $\text{thk}_1 := 15\text{mm}$

$k_4 := 0.6\,\frac{\text{W}}{\text{m}\cdot\text{K}}$ $\quad$ $k_3 := 0.6\,\frac{\text{W}}{\text{m}\cdot\text{K}}$ $\quad$ $k_2 := 0.173\,\frac{\text{W}}{\text{m}\cdot\text{K}}$ $\quad$ $k_1 := 73\,\frac{\text{W}}{\text{m}\cdot\text{K}}$

$T_{in} := 1300\text{K}$ $\quad$ $T_{12} := 1000\text{K}$ $\quad$ $T_{23} := 1000\text{K}$ $\quad$ $T_{34} := 800\text{K}$ $\quad$ $T_s := 200\text{K}$ $\quad$ $T_{air} := 20\text{K}$

$\varepsilon := 0.93$

given

$$\frac{k_1}{\text{thk}_1}\cdot(T_{in} - T_{12}) = \frac{k_2}{\text{thk}_2}\cdot(T_{12} - T_{23})$$

$$\frac{k_3}{\text{thk}_3}\cdot(T_{23} - T_{34}) = \frac{k_2}{\text{thk}_2}\cdot(T_{12} - T_{23})$$

$$\frac{k_3}{\text{thk}_4}\cdot(T_{23} - T_{34}) = \frac{k_4}{\text{thk}_4}\cdot(T_{34} - T_s)$$

$$2.5\,\frac{\text{W}}{\text{m}^2\text{K}}\cdot(T_s - T_{air}) + \varepsilon\cdot\sigma\cdot\left[(T_s + 273.15\text{K})^4 - (T_{air} + 273.15\text{K})^4\right] = \frac{k_4}{\text{thk}_4}\cdot(T_{34} - T_s)$$

$$\begin{pmatrix} T_{12} \\ T_{23} \\ T_{34} \\ T_s \end{pmatrix} := \text{find}(T_{12}, T_{23}, T_{34}, T_s)$$

$$\begin{pmatrix} T_{12} \\ T_{23} \\ T_{34} \\ T_s \end{pmatrix} = \begin{pmatrix} 1299.1647 \\ 1064.1750 \\ 589.8877 \\ 115.6003 \end{pmatrix}\text{K}$$

$$\varepsilon \cdot \sigma \cdot \left[\left(T_s + 273.15K \right)^4 - \left(T_{air} + 273.15K \right)^4 \right] = 814.9703 \frac{W}{m^2} \qquad 2.5 \frac{W}{m^2 K} \cdot \left(T_s - T_{air} \right) = 239.0007 \frac{W}{m^2}$$

$$\frac{814.9703}{239.0007} = 3.4099$$