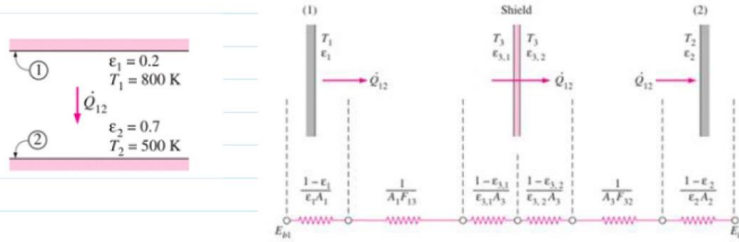


Week6

Task 1

Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel plates), how many shields with $\epsilon = 0.1$ should you add in order to have the new heat transfer rate to be 1% of the case without shields?



Without shield, $\epsilon_1 = 0.2$ and $\epsilon_2 = 0.7$,

$$\dot{Q}_{12} = \frac{E_{b1} - E_{b2}}{\frac{1 - \epsilon_1}{A\epsilon_1} + \frac{1}{AF_{12}} + \frac{1 - \epsilon_2}{A\epsilon_2}} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1}$$

With N shield $\epsilon_3 = 0.1$

$$\begin{aligned} \dot{Q}_{12N\text{shields}} &= \frac{E_{b1} - E_{b2}}{\frac{1 - \epsilon_1}{A\epsilon_1} + \frac{1}{AF_{13}} + \frac{1 - \epsilon_3}{A\epsilon_3} + N \times \left(\frac{1 - \epsilon_3}{\epsilon_3 A\epsilon_3} + \frac{1}{AF_{33}} + \frac{1 - \epsilon_3}{A\epsilon_3} \right) + \frac{1 - \epsilon_3}{A\epsilon_3} + \frac{1}{AF_{32}} + \frac{1 - \epsilon_2}{A\epsilon_2}} \\ &= \frac{A\sigma(T_1^4 - T_2^4)}{A\sigma(T_1^4 - T_2^4)} = \frac{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_3} - 1 \right) + N \left(\frac{1}{\epsilon_3} + \frac{1}{\epsilon_3} - 1 \right) + \left(\frac{1}{\epsilon_3} + \frac{1}{\epsilon_2} - 1 \right)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1 \right) + (N + 1) \left(\frac{1}{\epsilon_3} + \frac{1}{\epsilon_3} - 1 \right)} \\ \frac{\dot{Q}_{12N\text{shields}}}{\dot{Q}_{12}} &= \frac{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1 \right) + (N + 1) \left(\frac{1}{\epsilon_3} + \frac{1}{\epsilon_3} - 1 \right)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = 1 + (N + 1) \frac{\frac{1}{\epsilon_3} + \frac{1}{\epsilon_3} - 1}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = 100 \end{aligned}$$

$$\Leftrightarrow N = 99 \times \frac{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1}{\frac{1}{\epsilon_3} + \frac{1}{\epsilon_3} - 1} - 1 = 99 \times \frac{\frac{1}{0.2} + \frac{1}{0.7} - 1}{\frac{1}{0.1} + \frac{1}{0.1} - 1} - 1 \approx 27.3$$

Conclusion: 27 shields can be added.

Task 2

The first stage in making the building is to set the top view, then draw it.
next step is offset and then make it three level.
In next step adding shader.
Then adding information with open studio and then adding weather data
And processing and end to result.

