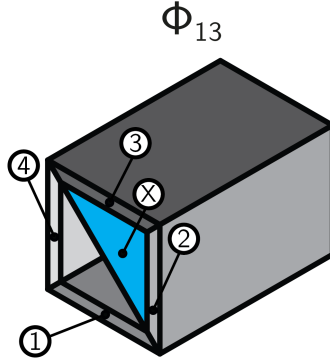# View Factor 18

The image shows a long square body. Determine the view factor Φ_{13}:

A flat plate can never see itself and therefore:

$$\Phi_{11} = \Phi_{22} = \Phi_{33} = \Phi_{44} = 0$$

One could think of a diagonal auxiliary plane X. From symmetry, it can be seen that:

$$\Phi_{X1} = \Phi_{X2} = \Phi_{X3} = \Phi_{X4} = \frac{1}{2}$$

Using the reciprocity rule it yields that $(A_1\Phi_{1X} = A_X\Phi_{X1})$:

$$\Phi_{1X} = \Phi_{X1}\frac{A_X}{A_1} = \frac{1}{2}\frac{\sqrt{W^2 + W^2} \cdot L}{W \cdot L} = \frac{1}{\sqrt{2}}$$

Where W and L are the respective width and length of surfaces 1, 2, 3 and 4.

From symmetry, it can also be seen that $\Phi_{14} = \Phi_{12}$. Combining this with the summation rule $(\Phi_{11} + \Phi_{14} + \Phi_{1X} = 1)$, it yields:

$$\Phi_{12} = \Phi_{14} = 1 - \Phi_{1X} - \Phi_{11} = 1 - \frac{1}{\sqrt{2}}$$

As Φ_{11}, Φ_{12} and Φ_{14} are known we can use again the summation rule for the case without the auxiliary plane X $(\Phi_{11} + \Phi_{12} + \Phi_{13} + \Phi_{14} = 1)$. This yields:

$$\Phi_{13} = 1 - \Phi_{11} - \Phi_{12} - \Phi_{14} = -1 + \frac{2}{\sqrt{2}}$$