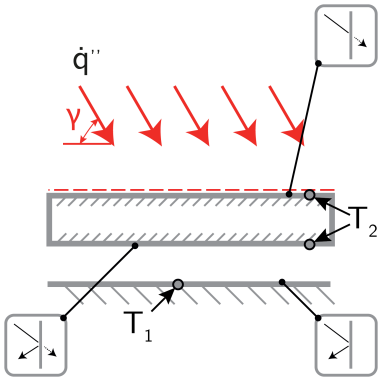
Surface Brightness 23

Determine the surface brightness $\dot{Q}_{2,\text{top}}$. Use surface brightnesses whenever possible.



Definition of the surface brightness:

$$\dot{Q}_{2,\text{top}} = \dot{Q}_{2,\text{top},\epsilon} + \cancelto{0}{\dot{Q}_{2,\text{top},\rho}} + \dot{Q}_{2,\text{top},\tau}$$

Defining the emitted, reflected and transmitted radiation:

The emitted radiation of a black body radiator can be stated as:

$$\dot{Q}_{2,\text{top},\epsilon} = \epsilon_{2\text{t}} \sigma A_2 T_2^4$$

The transmitted radiation can be expressed by the transmission coefficient and the radiation being transferred toward the bottom of the body:

$$\dot{Q}_{2,\text{top},\tau} = \tau_{2\text{b}} \cancelto{1}{\Phi_{12}} \dot{Q}_1$$

Inserting and rewriting:

$$\Rightarrow \dot{Q}_{2,\text{top}} = \epsilon_{2\text{t}} \sigma A_2 T_2^4 + \tau_{2\text{b}} \dot{Q}_1$$

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