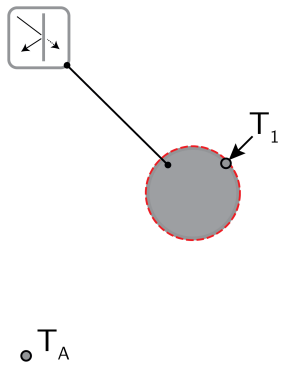
Surface Brightness 05

Determine the surface brightness $\dot{Q}_1$.



Definition of the surface brightness:

$$\dot{Q}_1 = \dot{Q}_{1,\epsilon} + \dot{Q}_{1,\rho} + \dot{Q}_{1,\tau}$$

Defining the emitted, reflected and transmitted radiation:

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

$$\dot{Q}_{1,\epsilon} = \epsilon_1 \sigma A_1 T_1^4$$

The reflected radiation can be expressed by the reflection coefficient and the radiation being transferred toward the body:

$$\dot{Q}_{1,\rho} = \rho_1 \dot{Q}_\mathrm{A} = \rho_1 \sigma A_1 T_\mathrm{A}^4$$

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

$$\dot{Q}_{1,\tau} = \tau_1 \dot{Q}_\mathrm{A} = \tau_1 \sigma A_1 T_\mathrm{A}^4$$

Inserting and rewriting:

$$\Rightarrow \dot{Q}_1 = \epsilon_1 \sigma A_1 T_1^4 + (\rho_1 + \tau_1)\, \sigma A_1 T_\mathrm{A}^4$$