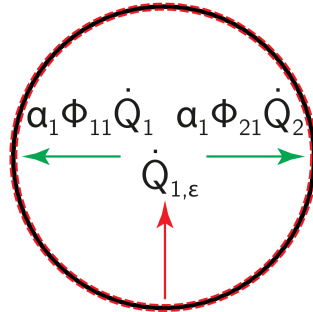


## EB - Rad. - Inner 03

Write the inner energy balance for object 1 being in thermal equilibrium. Use view factors and surface brightness whenever possible.



**Energy balance:**

$$\frac{\partial U}{\partial t} = \sum \dot{Q}_{\text{in}} - \sum \dot{Q}_{\text{out}}$$

$$0 = \Phi_{11} \dot{Q}_1 + \Phi_{21} \dot{Q}_2 - \dot{Q}_{1,\epsilon}$$

**Heat fluxes:**

The surface brightnesses of bodies 1 and 2 will be determined in a separate task and can be stated as  $\dot{Q}_1$  and  $\dot{Q}_2$  respectively.

The emitted radiation of body 1 by use of the emission coefficient, which is equal to one for a black body radiator, and the Stefan-Boltzmann law:

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

**Substituting and rewriting:**

$$0 = \left( \Phi_{11} \dot{Q}_1 + \Phi_{21} \dot{Q}_2 \right) - A_1 \sigma T_1^4$$