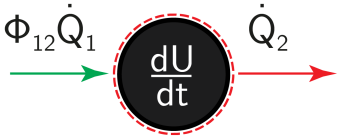
EB - Rad. - Outer 07

Set up the outer energy balance for the body 2 that describes the change of its homogeneous temperature T_2 over the course of time. Use view factors and surface brightness whenever possible.



Energy balance:

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

$$\frac{dU}{dt} = \Phi_{12}\dot{Q}_1 - \dot{Q}_2$$

Change of internal energy over time:

$$\frac{dU}{dt} = m_1 c_1 \frac{dT_1}{dt}$$

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.

Substituting and rewriting:

$$\Rightarrow m_1 c_1 \frac{dT_1}{dt} = \Phi_{12}\dot{Q}_1 - \dot{Q}_2$$