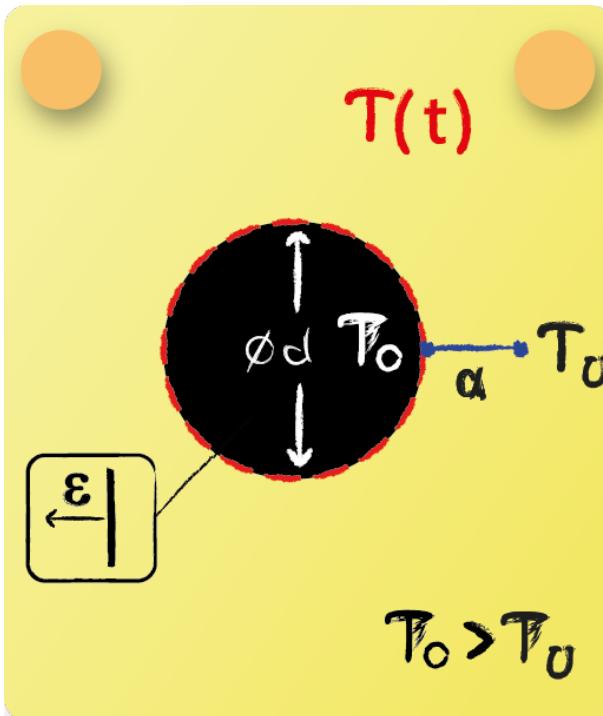


Energy Balance: Task 2



Set up the sphere's transient energy balance for $Bi \ll 1$.

1



The condition $Bi \ll 1$ states that thermal resistance at the body's surface is orders of magnitude greater than thermal resistance inside the body. This yields to the assumption of a homogeneous temperature distribution within the sphere. There are two outgoing heat fluxes indicated by given quantities ϵ for radiative emission and α for convection. The temporal change of internal energy is than formulated as:

$$\frac{\partial U}{\partial t} = -\epsilon \pi d^2 \sigma T^4 - \alpha \pi d^2 [T(t) - T_U]$$