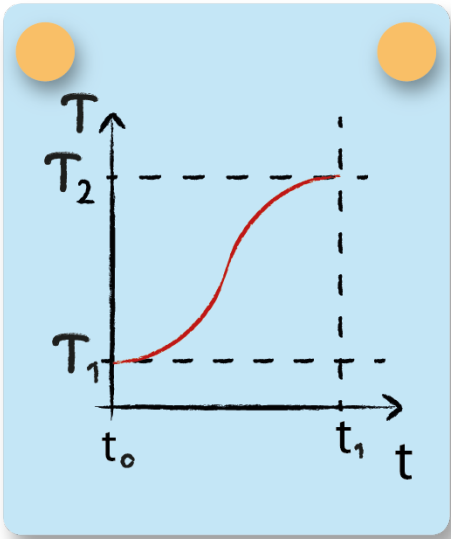
Temperature Profile Transient 4

A sphere with radius R initially has a homogeneous temperature T_1. At the time t_0 it is flowed against with $u(t)$. The airflow has a constant temperature T_2. Mark the diagram with the correct solution for the temporal development of the sphere temperature, if α linearly increases from $\alpha(t_0) = 2$ to $\alpha(t_1) = 4$.



When time passes, α increases. Therefore more heat is being transferred and the slope of the temperature profile increases.

But at some point in time, the effect of the temperature difference getting smaller gets more dominant compared to the linearly increasing α. Therefore, less heat is transferred and the slope of the temperature decreases again until it reaches its equilibrium temperature T_2.