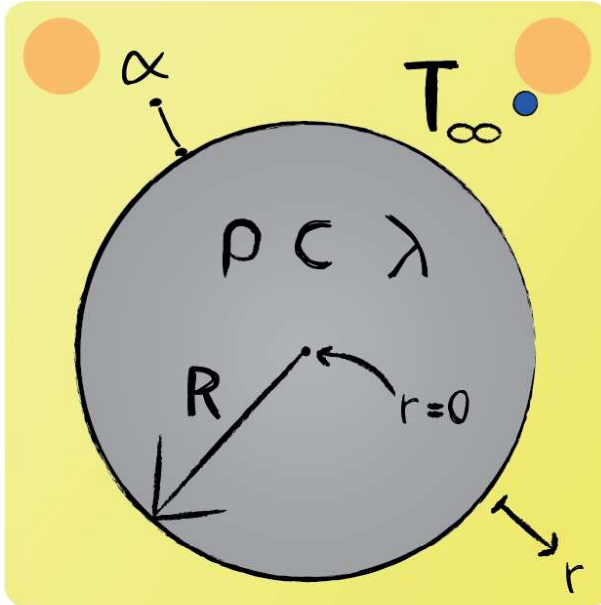


Exam Preparation - Conduction 21



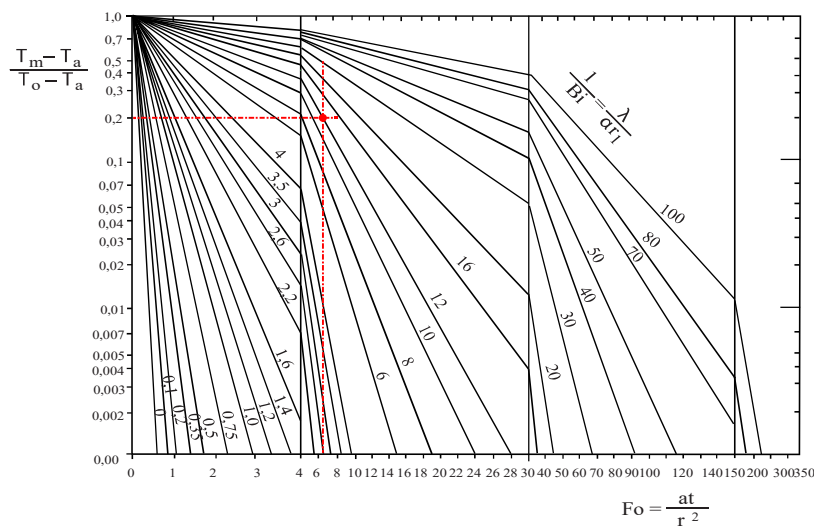
A sphere with radius $R = 1$ cm with initial homogeneous temperature $T(r, t = 0) = 293$ K, is suddenly exposed to a medium of temperature $T_A = 353$ K. Determine the time t_1 at which $T(r = 0, t_1) = 341$ K is reached.

Problem type:

One-dimensional, unsteady-state heat conduction that does penetrate.

$$\frac{1}{Bi} = \frac{\lambda}{\alpha \cdot r_1} = 12$$

$$\frac{T_m - T_a}{T_o - T_a} = 0.2$$



$$\rightarrow Fo = 6.48$$

$$t = 481.08 \text{ s}$$