
CONCEPT QUESTIONS - Transient conduction

1. For the following questions, assume that the conductive body in question is initially all at one temperature, T_i and is put into a convective environment at time $t = 0$. The convective environment has a heat transfer coefficient of h and is at temperature T_∞ .
 - a. Find an expression for the dimensions temperature (θ) at the center of an infinite slab of half thickness L as a function of time.

 - b. Find an expression for the dimensions temperature (θ) at the center of an infinitely long cylinder as a function of time.

 - c. Find an expression for the dimensions temperature (θ) at the center of a solid sphere as a function of time.

 - d. Comment on your answers to a-c.

2. Find an expression for the *maximum* heat that can be transferred (Q with no dot) to a slab, infinitely long cylinder or sphere as described in problem 1. (Hints: At what *time* does Q_{max} occur? What is the temperature of *the entire body* at this time?)