Heat Transfer Questions & Answers

Question by Student 201627118

Dear Professor, for Assignment # 3, Question # 1, I would like to use the chart for Efficiencies of Circumferential Fins. Therefore, in order to find Fin Efficiency, I need to find the following value:

$$L_c^{\frac{3}{2}} \left(\frac{h}{kA_m} \right)^{\frac{1}{2}}$$

I checked the Table for Property Values for Metals to obtain the thermal conductivity (k) for Aluminum, which is not given in the problem. However, on that table, there are different values for k depending on the temperature. In this case, which value should I use for k?

Well choose a value that will be reasonable in this case. Either the base temperature of the fin, or the average between the fin base temperature and the fluid temperature far from the fin. 0.5 point bonus.

Question by Student 201327132

Dear, professor. I have a question for calculate temperature unit. How to calculate

$$\frac{K}{^\circ C}$$

I confuse that relation.

I don't understand what you mean. Please explain better.

Question by Student 201327132

Dear Professor. Sorry to my poor explanation. I have no idea how to calculate in assignment 4, question 5, Biot number.

$$\frac{hR}{3k} = \frac{3[W/m^2 K] \times 0.0245[m]}{0.147[W/m^\circ C] \times 3} = 0.167[\frac{K}{^\circ C}]$$

So I don't understand that relationship.

$$0.167[\frac{-272^\circ C}{^\circ C}] or [\frac{K}{274K}]$$

Which one is correct? I can't find any solution this relationship. Thank you.

In this case, the Kelvin degrees used for h can be written as Celcius degrees because convection heat transfer is function of temperature difference only and a

difference in Kelvin is exactly the same as a difference in Celcius degrees.

Question by Student 201427115

Professor, I have a question about finding thermal Diffusivity. In table of Properties, I can find α directly. But when I use $\alpha = \frac{k}{\rho c}$ I get different answer. Which one should I use?

If you use k, ρ or c elsewhere in your problem, then to be consistent you should compute $\alpha = k/\rho c$ and not take it from the tables.

Question by Student 201327132

Dear professor. I wonder about insulated cable design problem(inner radius as small as possible). At previous assignments, we directly use $P_{elect} = S_{gen}$. But this example, Even though we know P_{elect}, we calculate
$$S_{gen} = R_{elect} \times \left(\frac{P_{elect}}{V}^2 \times L/2\pi r_i^2 \right).$$ *I don't know difference of two relations. Thank you.*

Hm I think I explained this in class. I am not sure what you don't understand. Tell us what exactly is confusing you..

Question by Student 201427115

Professor, I have a question about insulation. At the surface insulated, heat transfer is zero. But in assignment 1 problem #1, even the wall has insulation layer, it has heat transfer inside the insulation part. What's the difference between two? Thank you.

If an insulation layer is specified without a thermal conductivity, then assume its conductivity is zero (and hence there is no conduction heat transfer). If the insulation layer has a given thermal conductivity, then the heat transfer through the insulation layer will not be zero. 1 point bonus.