Heat Transfer Questions & Answers

Question by Student 201327139

Professor, I think Assignment #2, Q.5 (a) has wrong answer.

If you don't mind, would you check it again please? Thank you.

I think it's better if you sleep over it and look again carefully into your logic and algebra tomorrow when your mind is more fresh..

Question by Student 201327106

Professor, I have two questions with question 5 of assignment 2. Firstly, at (b), although you asked insulation and cable surface temperatures, answer is only 778.66'C. Is that means two temperatures are same? Secondly, I don't know what maximum insulation temperature actually means. Does it mean temperature difference between cable and outer surface of insulation? Thank you.

The maximum insulation temperature is the maximum temperature anywhere within the insulation. First, determine the location where the temperature is maximum and, two, calculate such temperature. The answers are not always complete. Some parts may not be given. You should be able to know if the temperature listed is the cable surface temperature or the insulation surface temperature.
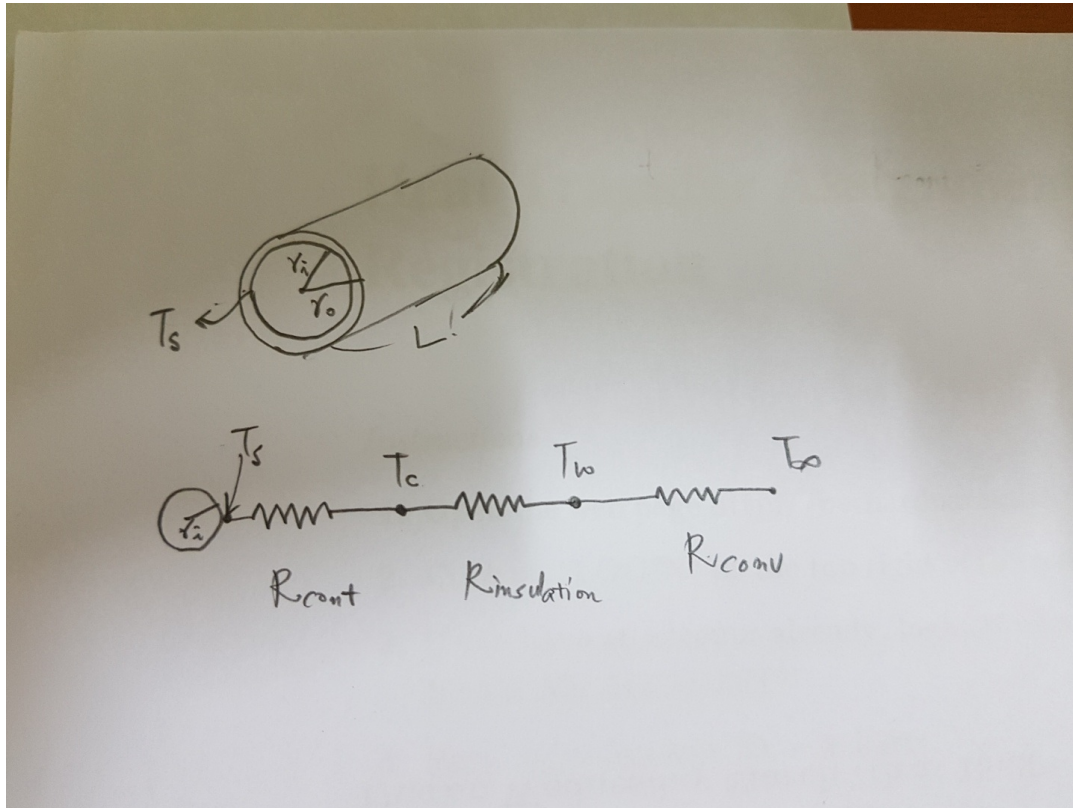
Question by Student 201627128

Dear professor, In class you mentioned that to enhance the heat transfer rate we can use fins as extended surfaces. And you also mentioned that the increase of surface area along where the convection occurs increases the heat transfer rate. An additional source stated that the heat transfer rate can also be increased by the thermal conductivity of the fin material. I would like to know if fins always enhance the heat transfer rate or if there are such specific cases where the use of fins lead to the reduction of heat transfer instead of enhancing it as it usually should happen.

Well, it's unlikely a fin will reduce the heat transfer. I guess this could happen exceptionally if there is a (very large) contact resistance between the fin and the base and if the fin is rather thick.. But then the loss of heat transfer will not be because of the fin itself but because of the contact resistance. 1 point bonus.

Question by Student 201227125

Professor, at Assignment2 - Question5

$T_s = 1153\,C$

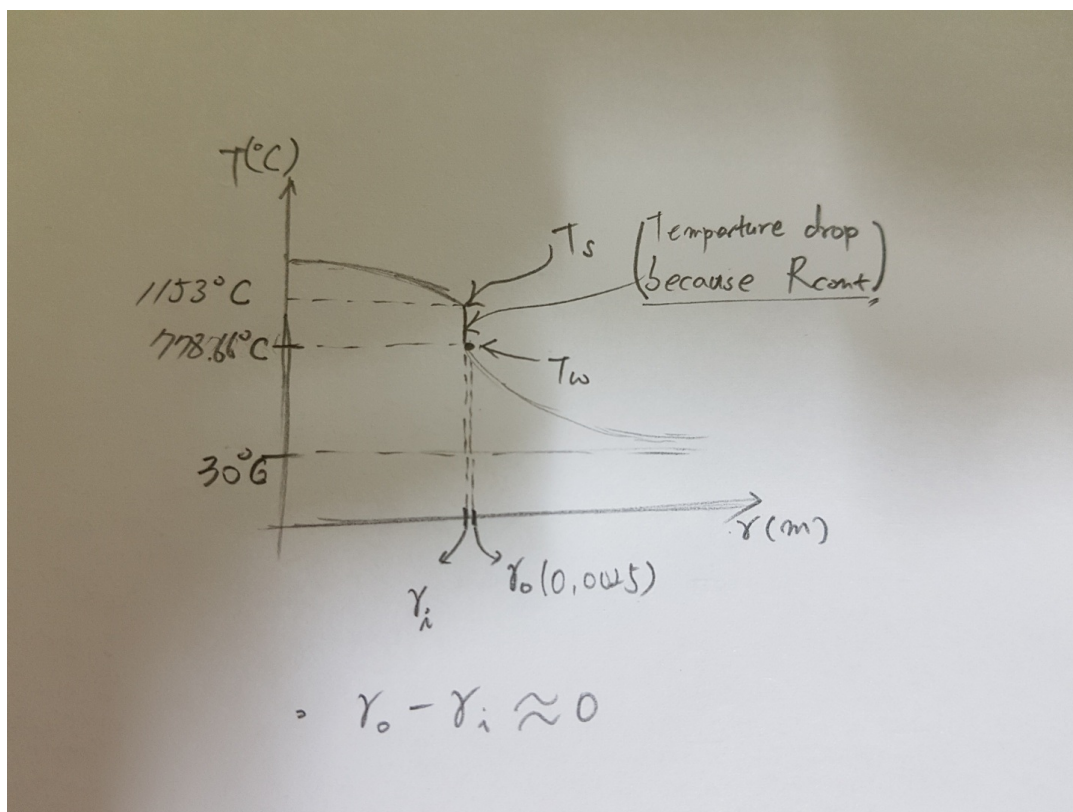*however, this question's answer is 778.66 Celsius*

if answer is 778.66 Celsius, R_{cont} should be 0 But in this case, can't make R_{cont} zero

See reply to previous question here:

Question by Student 201227125

so, in this question case, answer is not T_s. I will find T_w

if temperature profile this picture

Yes, You need to also find the cable temperature, but such answer is not listed.

Question by Student 201427111

Professor, I have a question about emissivity in class. Emissivity means $\frac{emitted-heat-flux}{heat-flux-emitted-if-black} = \frac{q_G\,rayout}{\sigma T_G^4 A}$. *I think that heat flux emitted if black is* $\sigma T_B A$. *therefore i don't know why heat flux emiited if black is* $\sigma T_G A$. *Is that same* $\sigma T_B A = \sigma T_G A$?

Well no, the heat flux emitted if black is σT_G^4 because T_G is the temperature of the matter. It doesn't matter if the matter is black or gray. 0.5 point bonus.