

AE331 HEAT TRANSFER
Online Quiz, No 7
December 23, 2020
(open notes and books)

Rules for the quiz

1. Your camera and microphone should be open during the quiz (you can reduce your speaker's volume if the voice is bothering you but you should not reduce the volume of your microphone)
2. You should not communicate with anybody during the quiz.
3. You should sit in front of your computer where the assistants can clearly see you even if you finish the quiz earlier.
4. You should be alone during the quiz.
5. Please sign the following statements and upload this page with your solution papers.

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I affirm that all the work done on this quiz is my own; have obeyed the rules indicated above and I have not given or received any help during this quiz. I understand that any indication of violation of this word of honor may lead to a zero grade on this quiz and to a disciplinary action.

Name: _____ ID number: _____ Date/Signature: _____

Question

Duration: 15 min for solution + 10 min for uploading

Assume that a fluid is moving over a flat plate that has a temperature of T_s . The freestream temperature of the fluid is T_∞ . Inside the fluid, the distribution of temperature ratio perpendicular to the flat plate is given as

$$\frac{T_s - T}{T_s - T_\infty} = \sin\left(\frac{\pi y}{0.0ab}\right)$$

The thermal conductivity of the solid plate is $1ab$ [W/m.K]. The thermal conductivity of the fluid is $0.ab$ [W/m.K]. At a location $a.b$ [m] from the leading edge,

- a) Calculate the thermal boundary layer thickness
- b) Calculate the convective heat transfer coefficient
- c) Calculate the Nusselt number

Where "a" and "b" are the symbols that represent the last two digits of your id number. For example, if your id number is 7134251 = 71342ab, then a=5, b=1. (If any of these symbols has a zero value and cause difficulties in the solution, you can replace this value with the third digit of your id number)