
EXERCISE: Find the correlation

1. A fluid flows past a flat plate of length $L=1.0$ m maintained at a constant temperature. The Reynolds number based on plate length is found to be $Re=2.0\times 10^6$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the rate of heat transfer from the plate. What correlation for Nu do you use?
2. A fluid flows past a flat plate of length $L=1.0$ m maintained at a constant temperature. The Reynolds number based on plate length is found to be $Re=2.0\times 10^4$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the rate of heat transfer from the plate. What correlation for Nu do you use?
3. A fluid flows past a flat plate of length $L=1.0$ m maintained at a constant temperature. The Reynolds number based on plate length is found to be $Re=2.0\times 10^6$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the heat flux at the trailing edge of the plate, i.e., at $x=L$. What correlation for Nu do you use?
4. A fluid flows past a flat plate of length $L=1.0$ m maintained at a constant temperature. The Reynolds number based on plate length is found to be $Re=2.0\times 10^5$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the rate of heat transfer from the plate. What correlation for Nu do you use?
5. A fluid flows past a flat plate of length $L=1.0$ m subject to a constant surface heat flux. The Reynolds number based on plate length is found to be $Re=8.0\times 10^5$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the heat flux at the trailing edge of the plate, i.e., at $x=L$. What correlation for Nu do you use?

6. A fluid flows past a flat plate of length $L=1.0$ m maintained at a constant temperature. The Reynolds number based on plate length is found to be $Re=8.0\times 10^5$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the heat flux at a location $x=0.25$ m from the leading edge of the plate. What correlation for Nu do you use?

7. A fluid flows past a flat plate of length $L=1.0$ m maintained at a constant temperature. The Reynolds number based on plate length is found to be $Re=8.0\times 10^5$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know total rate of heat transfer from the plate. What correlation for Nu do you use?

8. A fluid at temperature T_∞ flows past a flat plate of length $L=1.0$ m subject to a known constant surface heat flux q . The Reynolds number based on plate length is found to be $Re=2.0\times 10^5$ and the Prandtl number of the fluid is $Pr=0.9$. You wish to know the surface temperature at the trailing edge of the plate, i.e., at $x=L$. What correlation for Nu do you use and how do you calculate the temperature?