ENSC 388

Assignment #9 (Local Heat Transfer Coefficient)

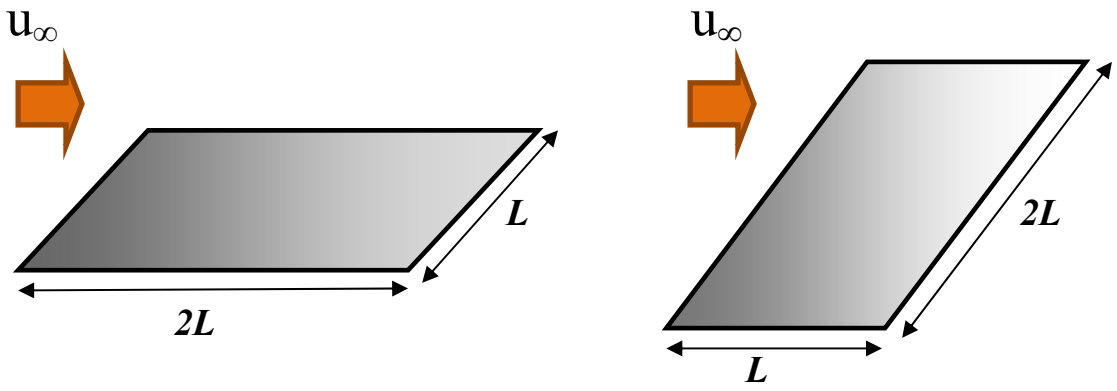
Assignment date: Wed Nov. 25, 2009

Due date: Wed Dec. 2, 2009

Problem 1

Explain under what conditions the total rate of heat transfer from an isothermal flat plate of dimensions L by $2L$ would be the same, independent of whether parallel flow over the plate is directed along the side of length L or $2L$. With a critical Reynolds number of 5×10^5, for what values of Re_L would the total heat transfer be independent of orientation?

We assume that the plate temperatures and flow conditions are equivalent.



Problem 2

The surface of a 1.5 m long flat plate is maintained at 50°C and water at a temperature of 4°C and a velocity of 0.6 m/s flows over the surface. Determine:

a) The heat transfer rate per unit width of the plate in W/m.

b) If a wire were placed near the leading edge of the plate (to induce turbulence), what would be the heat transfer rate?