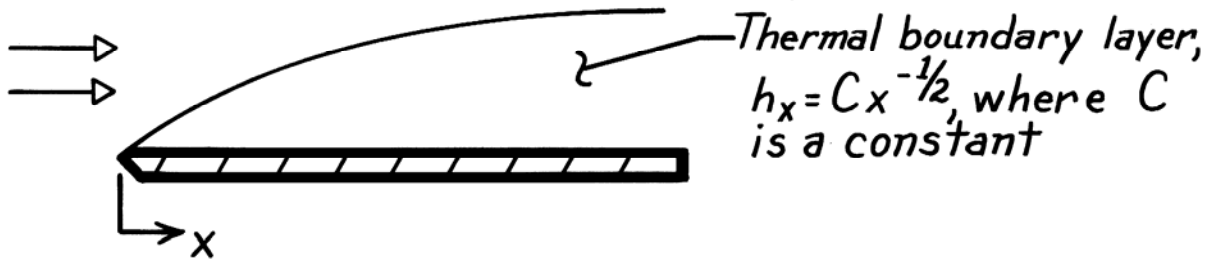


PROBLEM 6.5

KNOWN: Variation of h_x with x for laminar flow over a flat plate.

FIND: Ratio of average coefficient, \bar{h}_x , to local coefficient, h_x , at x .

SCHEMATIC:



ANALYSIS: The average value of h_x between 0 and x is

$$\begin{aligned}\bar{h}_x &= \frac{1}{x} \int_0^x h_x dx = \frac{C}{x} \int_0^x x^{-1/2} dx \\ \bar{h}_x &= \frac{C}{x} 2x^{1/2} = 2Cx^{-1/2} \\ \bar{h}_x &= 2h_x.\end{aligned}$$

Hence, $\frac{\bar{h}_x}{h_x} = 2.$

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COMMENTS: Both the local and average coefficients decrease with increasing distance x from the leading edge, as shown in the sketch below.

