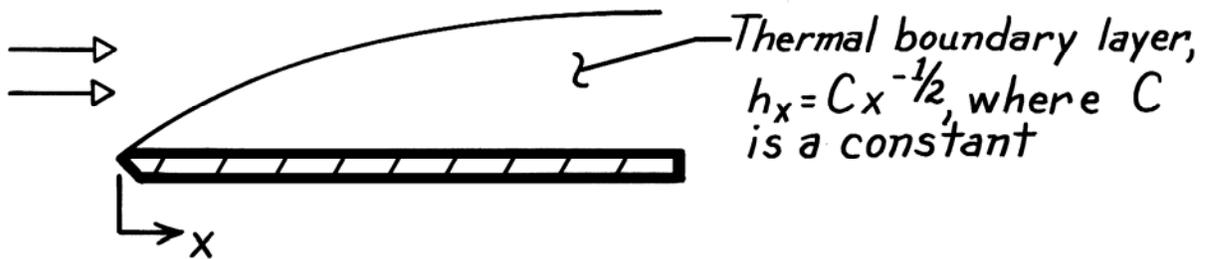


### PROBLEM 6.5

**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.

