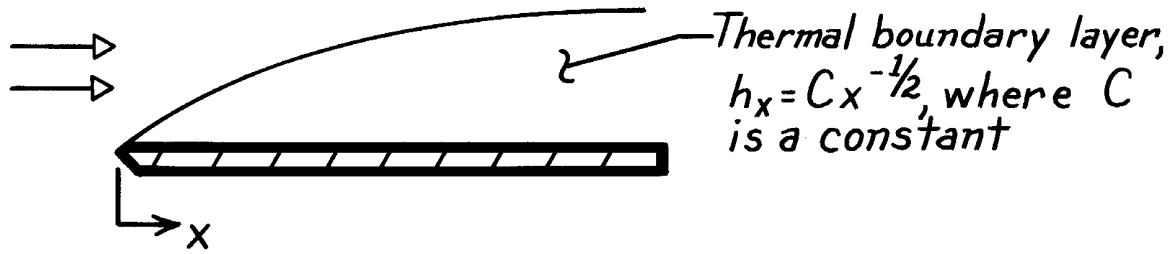
PROBLEM 6.1

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

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

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

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