ME 323, Spring 2008, Tues. May 13

Homework #6, due Tues. May 20 beginning class, (text: Incropera & DeWitt, ID)

Reading (ID) Convection Heat Transfer: Internal flow:
Review 8.1, read 8.2—8.6

Problem (ID):

Internal Flow

8.22 Engine oil at a rate of 0.02 kg/s flows through a 3 mm diameter tube 30 m log. The oil has an inlet temperature of 60 ^{o}C, while the tube wall temperature is maintained at 100 ^{o}C by steam condensing on its outer surface.

- Estimate the average heat transfer coefficient for internal flow of the oil.
- Determine the outlet temperature of the oil.
- Are the requirements for the correlation, Eq. 8.57 satisfied?
- Is evaluating the properties at $T_{ave} = (T_{m,i}+T_{m,o})/2$ satisfactory?
- Assume the flow is fully developed, compute *h* and $T_{m,o}$ (compare with solution to 8.22)

8.26

8.74