Homework 9 – Due May 1 2013

Questions: 8.8, 8.34, 8.48, 8.62, 8.100 (use figure 8.23 for this problem – cut and paste below)

1)

8.8 A soft drink with the properties of 10 °C water is sucked through a 4-mm-diameter, 0.25-m-long straw at a rate of 4 cm³/s. Is the flow at the outlet of the straw laminar? Is it fully developed? Explain.

2)

8.34 Water flows at a rate of 2.0 ft³/s in an old, rusty 6-in.-diameter pipe that has a relative roughness of 0.010. It is proposed that by inserting a smooth plastic liner with an inside diameter of 5 in. into the old pipe as shown in Fig. P8.34 the pressure drop per mile can be reduced. Is it true that the lined pipe can carry the required 2.0 ft³/s at a lower pressure drop than in the old pipe? Support your answer with appropriate calculations.
3) Air flows through the fine mesh gauze shown in Fig. P8.48 with an average velocity of 1.50 m/s in the pipe. Determine the loss coefficient for the gauze.

![Diagram of gauze flow](image1)

4) Water flows from the container shown in Fig. P8.62. Determine the loss coefficient needed in the valve if the water is to “bubble up” 3 in. above the outlet pipe.

![Diagram of water flow](image2)
8.100 Water flows through the orifice meter shown in Fig. P8.100 at a rate of 0.10 cfs. If \( d = 0.1 \) ft, determine the value of \( h \).