

Homework 9

Due Nov 24th.

(1) A fluid of density 1000 kg/m^3 and viscosity 0.30 kg/(m s) flows steadily down a vertical pipe that is 10m long and has a 0.1 m diameter. The water exits the pipe as a free jet at the bottom. Determine the maximum pressure possible at the top of the pipe if the flow at the exit is laminar.

(2) A fluid flows in a smooth pipe with a Reynolds number of 6000 . By what percent would the head loss be reduced if the flow could be maintained as laminar flow rather than the expected turbulent flow?

(3) Book 8.41

(4) Book 8.77

(5) In order to figure out the roughness of a garden hose you perform the following experiment. You drain an above ground pool whose surface is 3 m above the hose outlet. For a hose of 10m length and 1.5 cm inner diameter you measure the flow rate to be $2.0 \times 10^{-4} \text{ m}^3/\text{s}$. What is the hose roughness?