

Review Lecture I
Sep 29th, 2017

HWs 1, 2, 3

1. Pressure variation in static fluid: Read Whitaker.

- a. Understand the components of forces to calculate pressure variation in fluid.
- b. Barometer, Manometer, Hydrometer: Expressions for pressure calculation.



Expectation: a) Can write force balance on a fluid system b) Use components of forces in a given scenario c) Pressure calculations in case of barometer and manometers

2. Mechanisms of Momentum Transport : Read BSL chapter 1 introduction, 1.1, 1.2, 1.7

- a. Understand the components of momentum transport in any physical scenario
- b. Be able to explain the reasons behind momentum transport and drivers for each component.



Expectation: Be able to write momentum transport components in a given situation of fluid flow. Know all the expressions of momentum components ($\phi = P + \tau + \rho \vec{v}\vec{v}$)

3. Shell Momentum Balances: Read BSL, Chapter 2 introduction, 2.1, 2.2, 2.3 and all solved examples in these sections.

- a. Use shell momentum balance to obtain velocity profile for a given geometry and given scenario
- b. Use velocity profile to get average velocity, maximum velocity, mass flow rate and forces on the solid by the fluid.
- c. Understand and apply Hagen-Poiseuille equation.
- d. State all assumptions in shell momentum balance and the reason behind the assumptions.

Expectation: Be able to apply shell momentum balance. Derive velocity profiles and solve for max velocity, mass flow rate and forces on the solid by the fluid in Cartesian (Channel, Slit, plate geometry problem) and cylindrical coordinates (Tube problem)