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MET330

Test Reflection 2

1) How and why the test demonstrates your work toward one, or more, of the course learning objectives. Be specific on the course objectives you decide to mention.

- a. The test demonstrates my work as we:
 - i. Discuss what buoyancy is and determine object stability while floating or submerged in a fluid;
 - ii. Explain the fluid dynamics in pipes and fittings;
 - iii. Identify and solve for different very specific industrial problems, such as, open-channel flow, cavitation, water hammer, drag, lift, forces in pipes, and learn about different instruments to measure fluid flow quantities (such as, pressure, fluid velocity, flow velocity, etc.);

2) How your test compares against the available solution. State the mistakes you made and what you will do next time to avoid making same mistakes. Please point out exactly where you made the mistake, say why you made the mistake, and how you should have done it. If you were taking this test again, what advice would you give yourself to ensure that you had a successful test?

- a. I didn't account for the piezometric head in the way it was intended. I factored in the pressure above the flange location but didn't do it correctly. For the reaction forces, which was question 2, I segmented the system and only considered forces in elbows, which was a mistake. Segmenting the system and ignoring parts is not the approach needed. However, I did correctly apply the equations in x and y. For 3, I did calculate the correct value of ΔP , as well as a relatively close value to the ΔP for water hammer. I then computed the wall thickness and ensured the system will hold in the event of a sudden valve closure. I did make a mistake in cavitation, where I appear to say that the maximum pressure means cavitation will not occur. I do know that this was a miswriting, and that cavitation would not occur. Simply a case of writing the wrong number.
- b. For part B, I did create a reasonable amount of space but used a much more conservative estimate for dangerous water level, which was at the waist. I did get the same amount of width and the calculations for the total height were correct, which is what matters. As such, my flow rate was a little off, however it was not an issue as this is due to the conservative estimate stated above. My drag force, however, was not right. I did not use the correct value of C_d , but otherwise my calculations were correct. For the last question about the tube, I did calculate the sinking of the tube, but did not obtain a correct value. Though my process was

correct. I did calculate the metacenter correctly, but used the wrong value in the final equation, resulting in an unstable tube.

- 3) What your grade should be. Base it on the writing rubric provided in the test and the correctness of your solution. What are the strengths and weaknesses of your test?

WRITING RUBRIC (Applied to the whole test, not to particular problems)

Purpose	0.5/10.0 out of 0.5/10.0
Drawings	1.0/10.0 out of 1.0/10.0
Sources	1.0/10.0 out of 1.0/10.0
Design considerations	1.0/10.0 out of 1.0/10.0
Data and variables	0.5/10.0 out of 0.5/10.0
Procedure	2.0/10.0 out of 2.0/10.0
Calculations	2.0/10.0 out of 2.0/10.0
Summary	0.5/10.0 out of 0.5/10.0
Materials	0.5/10.0 out of 0.5/10.0
Analysis	1.0/10.0 out of 1.0/10.0
TOTAL	10.0/10.0 out of 10.0/10.0

Force on the flange

Consider piezometric head (get pressure above fluid)	1/25 out of 1/25
Force magnitude	1/25 out of 1/25
Force location	0/25 out of 1/25
Pipe-elbow forces	
Free body diagram and correct forces	0.5/25 out of 1/25
Force in x – solve for Rx	0.5/25 out of 1/25
Force in y (weight) – solve for Ry	0.5/25 out of 1/25

Flow-nozzle flowmeter pressure drop	
Right equation and A_1/A_2	1/25 out of 1/25
C value	1/25 out of 1/25
Water hammer pressure increase and cavitation	
Wave velocity (units?)	1/25 out of 1/25
Pressure increase and P_{max}	1/25 out of 1/25
Pipe thickness	1/25 out of 1/25
Lowest pressure & compare to sat pressure (cavit)	0.5/25 out of 1/25
Flow in the open channel	
Lazy river dimensions	1/25 out of 1/25
Correct equation	1/25 out of 1/25
Area and hydraulic radius	1/25 out of 1/25
Drag force on the child	
Correct equation to use	1/25 out of 1/25
Correct area and velocity	1/25 out of 1/25
How C_d was obtained?	0/25 out of 1/25
Lazy river tube floating – stability	
Realize $F_b=W$ and solve for distance into water	1/25 out of 1/25
Compute metacenter location	0.5/25 out of 1/25
Realize metacenter will always be above cg	0.5/25 out of 1/25
Correct results?	2/25 out of 4/25

FINAL GRADE: $10 + (80)*(16.5/25) = 66$

4) Discuss the following:

a. What issues did you encounter in completing the test? How did you troubleshoot them?

I had issues with no concepts except making small mistakes along the way.

b. What steps did you take to complete the whole test? Would you change something?

c. What new concepts have you learned?

Water hammer, forces due to moving and static fluids, buoyancy and stability, cavitation and open channel flow.

d. Where you think engineers use those concepts (provide specific examples)?

These concepts are used in designing civil engineering projects such as channels (open), pipelines, and boat design.

e. Where do you think you will be using everything you learned?

I'll use it in my career during design of pipelines, especially reaction forces, cavitation and water hammer.

f. Do you think what you learn is important for your professional career?

Yes, seeing as I will (hopefully) have a career in this subject.

g. How, when, where and why you might use this information or skill in the future?

I will use it at work to calculate and design pipeline systems,

h. Have you been able to apply concepts you have learned in the course to what you do at work or in other courses?

Some of Fluid Mechanics has applied to Thermal Applications as well, which is interesting.

i. What areas did you feel you were most successful, or improved the most?

I think I improved the most at water hammer and cavitation, since the rest was very simple to understand, though difficult to execute to completion.

j. How do you see this course's content intersecting with your field or career?

This is critical to my field, which is hopefully going to be Computational Fluid Dynamics. These principles will guide me for the rest of my career.

k. How much time did you spend on the test? How was the time organized? What would you do differently? Why?

I spent about six hours on this test blocked out through several days. I would do more per day instead of the amount I did, about one hour a day.