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MET 330

July 18th, 2023

Test – 3 Reflection

For test number 3 we were required to demonstrate our knowledge and ability to calculate the moment at the base of a pole consisting of two sections connected end to end with a force caused by wind at 80mph, the fluid height in an open channel as it flowed down a slight slope, the change in height of a manometer based upon the given flowrate and pipe diameter, the force on a curved section of pipe, and the change in pressure of a pipe when a valve suddenly closes.

In reviewing my exam compared to the provided solutions I found that I had quite a few issues overall. For the first question, I completely did not use the formula for the drag coefficient. I assumed that the problem was one that would be approached as a force due to a fluid in motion since air is considered a fluid. That lead me to manipulating the reactionary force equation so that the given information could be used to populate the equation and provide additional information. Furthermore, regarding the distances remembering back to my statics and dynamics classes when considering the top portion of the center of that force we always included the base distance upward in that calculation, thus for the top half of the pole an additional 6ft were added. Overall, for this equation I would give myself the following: Moment with respect to A: 0/5, Correct distances: 0/5, Correct Cd using Re and forces: 0/5, and the results: 0/5 for a total of: 0/5.

Moving onto the second question, this one was more easily understood and thus properly calculated. Since the units were in US customary, the correct constant was used as 1.49 vs 1.00 for SI units, and the rest of the question came along properly with only a slight deviation due to rounding differences within the performance of the question. Overall, for this equation I would give myself the following: Correct Q equations: 1/6, Correct A and Hydraulic Radius R: 1/6, Solving by iteration: 2/6, Is it critical: 1/6, and Results: 1/6, for a total of 6/6.

The third question went well like question two in that it just made more sense going into it and thus the results spoke for themselves. While the results seemed large, thinking about the given scenario for the shear flowrate and small-er diameter of the pipe it made sense that the change would be so large. Reviewing the results for the third question I found the following: Correct eq for Q for nozzle: 1/5, Use Re to get C: 1/5 (as found on spreadsheet), Solving by “h”: 2/5, and results 1/5 for a total of 5/5.

For the fourth question, I made a couple incorrect assumptions in the initial calculations that ended up carrying through the rest of the problem. While I did use Bernoulli’s equation for

pressure, I incorrectly used the diameter of the 4” pipe versus that of the 3” pipe this resulted in almost a doubling of the expected flowrate through the system. This carried through to the following velocity and continued to trickle down through the problem ending with the incorrect results. Additionally, when choosing the direction for the reactionary forces in the X an Y direction I again recalled how the forces would be negative or positive and thus pointed in which direction the force was relative to the X/Y plane and the chosen positive direction. Compute pressures using Bernoulli’s equation: 1/7, Compute height with length: 1/7, appropriate control volume: 1/7, Rx (with velocity direction): 0.5/7, Ry (with velocity direction): 0.5/7, Compute Q with Bernoulli’s: 1/7, and Results: 0/7 for a total of 5/7.

Finally for the last question, I correctly used the appropriate equation and units for the entirety of the problem. The only problem I entailed was that the textbook incorrectly listed the units in the appendix for the density of water thus requiring me to incorrectly change the units as listed from kN/m^3 to kg/m^3 which resulted in my answer being off by a factor of 3. Correct C: 2/4, deltaP: 1/4, and Results: 1/4, for a total of 4/4

In going over the whole test I encountered all the same issues I have encountered with my previous exams and that is a shear lack of time available to me. While trying to perform at a certain level at work, maintain a home life with my family, and take three courses over the summer which expedites the rate at which the information is given, something must give and unfortunately it ends up being school. To change this, I would go back to my 18 y/o self and tell him to stay in school versus going out and running around and take the time to focus on that point. As you get older it only becomes more and more difficult to find and make the time to take the classes you need to take to complete your degree successfully.

During this portion of the course, I learned the different ways a fluid will interact with a pipe, either straight or bent, and how the force is felt and spread over it. I believe that in my current career, the technical engineers that design the systems laid out at International Paper for the various fluids being pumped and moved around the site need to take into consideration how the fluid will interact with the pipe and its bends which can result in higher corrosion points within that system. I believe that I could apply the information I learned in my current role to help provide insight into how the systems are behaving and where we should route / change any flow points we currently have. I have not yet been able to apply what I have learned in this course to my job, but I did incorrectly incorporate what I learned in previous courses into this course. I was mostly successful for a portion of the exam, a major flaw that prevented me from doing even remotely well was the initial incorrect assumption that it was not a drag problem but more of a problem with how the fluid, air, was interacting with the diameter of the pipe and thus the moment caused by that. As previously stated, I see this course helping continue to grow my career as I continue to progress in my field to be able to provide more thoughtful insight into the systems and how they interact with the site.

For this test, as well as my others, I usually take the day to go through the test and ensure that I can do my best. This is due to what was previously talked about regarding the

timeframe available to me and thus my best solution is to try and set aside a day for myself to attempt to take it. Unfortunately for this exam my usual wakeup at 9am on Sunday and sit down to begin going through the exam started well, till about 1030 when my wife came bursting into my office regarding the somewhat new, 5-year-old, washing machine had decided to completely fail during the start of laundry that morning and spill its water contents all over the garage. This immediately pulled me away from my school requirements and into husband mode. Having successfully cleaned the mess up, being left with a pile of soaking wet cloths, and an even bigger pile of dirty that needed to be washed for the week, we were off to Lowe's to try and find a new washing machine for the family. Three hours, $800, and 1 test run later, we were off and going again with me being able to spend my time focusing back on my exam.

Fast-forward to 1030pm and my exam is done, and now it is time to try and squeeze in what I can for my last required homework for the section. After starting to put all the information down and get the ball rolling, I paused thinking that I should probably turn the exam in before I do anything else. I took my usual pictures with my phone scanning them as a PDF to email to my school account only to get an error message regarding the ability to send emails. No big deal, it's a new phone I will just reset it and try again, another failure. Ok, now maybe its due to the transfer of information to the new phone, I'll delete the email as a whole and start fresh, another failure. By now it is 1140pm and I am starting to panic, I'm yelling for my wife to bring me her phone, another failure but this time with a little bit more information in that it says the file size is too big. Ok, thinking of my next solution I realize I can scan the document directly into Drop Box, login to Drop Box on my PC, and just download it that way, sweet. It is now 1155 and Drop Box is loading as if I have a dial-up connection again. It loads, I download it and change the document name to show the exam and my information, it is now 1157pm. I pull up canvas, click on the exam and scroll down to the submission point, I click and the page crashes, it is now 1158. I open another tab, pull up canvas, rush to get it submitted and time is no longer on my side my wife is standing behind me watching as I breakdown. I immediately email you, which turns out to be your son as I am in his Thermo class right now (which is a compounding issue in that I should not have taken Thermo, Fluids, and the lab in the same summer semester as the timing is atrocious), luckily, he is awake and is able to respond and send the information to you, and that was my Sunday evening. So, in a nutshell, if I could do anything different it would have been literally all of that. I would have made it into a nice calm Sunday where I could focus and give it my best shot.