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MET 330

Professor Ayala

Test 3 Reflections

Introduction:

Test three focused on series and parallel pipeline systems, the systems were analyzed using given data to solve for the flow rate. The course objectives that this test includes are as follows; Apply the principles of conservation of energy (Bernoulli's equation) and mass to fluid flow systems, Compute friction losses in pipes for a variety of configurations (series, parallel, network, etc.). During this test I spent around six hours on it and roughly four hours of that was spent on formatting and solving for the flow rate equations for the second part of the question and the other two were spent on excel to complete the iterations.

Question 2 (Part 1)

The first part of the second question in this test gave the flow rate through a straight pipe with a known size. The change in pressure at two points 1500 ft apart had to be calculated, this was done by using Bernoulli's equation from either point. Once the equation had been set up the change in pressure head was equal to the energy loss between the two points. This energy loss was only due to the friction in the pipe, so the friction factor had to be found. This is where the main difference between my solution and the given solution since my Re was roughly 25,000 off. This is due to the different temperature that the posted solution used, and I used which change the kinetic viscosity and a different value for the relative roughness of the pipe was used. The change in pressure difference that this caused was roughly 2,500 lb/ft^2.

Question 2 (Part 2)

The second part of this question adds a different size pipe attached to the original pipe from the first part. The same change in pressure is to be used to now solve for the new flow rate with the added section of pipe. Since the same change in pressure will be used from the first part to the second the pressure difference between my solution and the posted one will cause the flow rate to change. The different value of relative roughness will also change the flow rate. The only other main difference between my solution and the posted one is that I used two different K values for the tees going to the separate pipes which will slightly change the answer but not drastically, it just adds more room for error in my solution. The final total Q that I found was 0.021 ft^3/s more than the solution posted.

Conclusion:

This test made me focus on how to use excel to make problems where iterations will need to be done easier than if doing them by hand. This concept applies to any problem where this needs to

be done, not just fluid mechanics problems. This test also made me really focus on energy losses and how to properly calculate them. I have not used any of this knowledge in the real world yet but using excel will be necessary for solving many real-world problems.

Grading:

1. Reasonable assumptions (reductions, valve, tubing diam, lengths) 1/10
2. Apply Bernoulli twice or get 2 equations from Bernoulli .75/10
3. Consider ALL minor losses? Handled them correctly? 1.75/10
4. Handled correctly the pipe losses? .75/10
5. Obtained 3 equations with 3 unknowns? .75/10
6. Solved system of equations correctly (Excel?)? 2.75/10
7. Results .75/10

TOTAL **8.5/10**

Final grade 76.5%