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A note on the Bernoulli Equation: CE122L.001-F2011

1 message

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Hi Class,

When you have the chance, I would like for you to take another look at your data for the Bernoulli lab. Many of you threw out flow calculations that included manometer #5 due to the values being too high. Also, I gave you the hint during the lab session to consider friction losses when answering the question about the validity of the Bernoulli Equation, and many of you said that friction losses are responsible for the differences between the flow rate you measured volumetrically and the flow from Bernoulli's Equation. However, most of you missed the main idea.

As water passes through the tube, friction causes the head downstream of any point to be lower than it would be without friction. This effect results in a larger h_1-h_2 value, which causes the Bernoulli Equation to predict a larger flow than it should. As the tube through which the flow passes tapers down, the surface area to volume ratio increases, intensifying the effects of friction on the pressure head and causing even larger flow calculations.

In other words, it is correct for the flow calculated by the Bernoulli Equation to be larger than the flow you measured using the graduated cylinder and stopwatch, and it is also correct for your flow from the Bernoulli Equation to vary depending on which manometer tubes you used. Therefore, when you're measuring something using two different methods, don't automatically assume that you're supposed to get the same answer! Instead, really think about the results you get and try to come up with a reason for them.

If you have any questions about this, please shoot me an email or stop by my office hours. Hopefully this note has been helpful for you.

Cheers,
Tiffany
