1. Introduction

In this section, you should introduce the experiment and take about 8-11 sentences to mention the concepts involved, how they apply to this experiment, and what you’re going to do with them. Think about *what* we’re doing and *why* we’re doing it. This is also a good place to relate the concepts being used to broader applications in fluid mechanics. You can briefly go over how the experiment will be run, but be careful not to get too specific. Finish up with what you expect to do with the experimental data, compare experimental to theoretical predictions.

1. Theory

The theory section should be where you get into more detail about the concepts involved. It is good to present a brief derivation of any relevant equations, but more importantly to talk about the limitations of each concept. What assumptions or restrictions must be met for each situation? It is also good to talk about what properties or variables each equation is dependent on. This helps build your intuition when thinking about these concepts. This section should leave the user feeling comfortable with the material so they can understand what’s going on in the procedure, results and analysis. This will probably be 2-3 pages in length. Be careful that you don’t simply paraphrase the theory section from the lab manual. This is tempting, since it’s nice and neatly packaged, but you can score a few extra points if you take the time to browse through your notes or text book and make good connections not mentioned in the handout. Also, don’t forget to center your equations and number them.

1. Measurement Methods

Measurement methods should provide an overview of how the measurements were taken and give enough information so the reader can replicate the experiment. This includes referencing all of the equipment used and how the measurements were taken. You can mention any issues with the equipment here also. This section is important to give the reader an understanding of how the results were obtained. This should be written in paragraph form in your own words, not numbered as it may be in a lab handout.

1. Analysis and Results

This section is all about presenting the facts. What data did you extract from the experiment and what happened when you analyzed it. You might also give equations that you found in the analysis. Raw data can be included as an appendix and referenced if necessary. Any numerical error analysis performed should be included with this section. Most of your data will be in the form of graphs or tables. Anything presented should be clearly marked with a figure or table number accompanied by a caption. A caption, however, does not replace a text explanation. You should include a few sentences to explain the analysis performed, referencing a given table or figure which contains the results. Again, you want the reader to understand how you got the data. Please label each subsection of the analysis that is required in the lab handout (1-6). See the example below:

5. Flow Rate Analysis

Using the experimentally found velocity profiles, an average velocity at each port was calculated using numerical integration in the form of the trapezoid rule. This average velocity was then used in equation 2.4 to find the flow rate. The flow rates for ports 1, 5, 8, and 10 are plotted below in figure 1.

Figure 1: Experimentally derived flow rates versus horizontal distance from inlet. From left to right, data shown is for ports 1, 5, 8, and 10.

1. Discussion

This section is your platform for expanding upon and explaining what you saw in your Analysis and Results, as well as how it all relates to the theory. Be clear in the connections you draw, and be careful not to introduce any new numbers, equations, or data here (that all belongs either in the theory or results sections). Your discussion section should seek to explain whether the results matched your hypothesis (in this case, whether the experimental and theoretical data matched). In this section it is important to state any assumptions or limitations that you may be applying by using a particular equation and whether or not you believe they are valid. Anything unexpected should be explained if possible. “*Because of turbulence”* isn’t a good explanation. *Why* is turbulence causing your error? Perhaps your equations assume laminar flow and are no longer valid (Note: this is a general example and not necessarily relating to this lab report). This is also a good point to think about the lab setup again and whether something unexpected might be due to equipment malfunction for instance. For the discussion please label each question that is required in the lab handout (1-5).

1. Conclusion

This should reiterate what you did, how you analyzed everything, and whether things were in agreement with your initial hypothesis or not, and if not what were the main sources of error. You should also note anything which could be further explored. Keep it short (5-8 sentences).

General things to note:

* This document is a general guideline. If you abide by it, you’ll likely get a good grade. The lab report process should prepare you for writing and presenting data professionally; therefore, the better you present the report, the better grade you will get. Remember, results are useless if you can’t effectively communicate them.
* Equations should be typed in an equation editor. Most word processors have them built in. Make sure equations are centered with a number along the right margin and all variables are defined in the text.
* Be careful with grammar, punctuation, capitalization, and other general rules of written English. While one or two mistakes can be overlooked, consistent errors will result in point deduction.