THE UNIVERSITY *of* EDINBURGH
School of Engineering

Fluid Mechanics 2 (SCEE08003) laboratory briefing note

Guidance on writing effective and supportable conclusions

Drawing clear, concise conclusions is clearly a vital skill in successful reporting, but can cause some difficulty. Think of the needs of your reader(s):

Initial questions to ask

How many conclusions?
Looking at the experiment's objectives can be a good guide; starting with an idea of one conclusion per objective will not be far wrong.

How long should each conclusion be?
Concise conclusions are generally preferred, although beware of using terms or symbols without definition. As a rough guide, for FM2, a conclusion is likely to be 1 to 3 sentences.

And what information should be in a conclusion?
If you think of the conclusions as being responses to the objectives, you will get this about right. Try to focus on principal findings.
✓ *The measured drag coefficients for a sphere over a range of Reynolds numbers from 1 to 7500 showed …*
✗ *There was some difficulty in extracting the test spheres from the sump at the base of the apparatus.*

Further advice

Be honest and realistic. Don't say that *e.g.* a linear relationship between applied torque and angle of twist has been shown, when a glance at the data or graph shows that such a conclusion could not have been drawn.

Draw quantitative conclusions wherever possible, remembering to note error bounds and units where appropriate.
✓ *The measured stresses agreed with theoretical predictions to within 5%.*
✓ *The theoretical value of the moment of inertia (I) was 0.25±0.01 kgm^2, Using the rolling method, I was measured as 0.23 ±0.03 kgm^2,*
✓ *The pressure distribution predicted according to Bernoulli's equation did not match the observations, showing discrepancies of up to 20%.*
✓ *The discharge coefficient was found to be 0.65 ±0.02.*
✗ *Measured and predicted stresses agreed quite well.*
✗ *The efficiency of the turbine was low.*

Suggest reasons for any discrepancy between predicted and measured results, *e.g.* the main source(s) of experimental error, limiting assumptions in the analysis method, or problems with equipment;
✓ *The main source of experimental error was in the measurement of fuel flow rate.*
✓ *The most likely reason for the over-prediction of the force is that the analysis neglects fluid friction.*
✓ *The divergence of the data from the expected linear relationship for higher angles of twist (>3 degrees) may be due to the bars having been twisted beyond their elastic limit in the past.*
✘ *The errors are large because the equipment is old.*

Conclusions should be readable in isolation of the main body of the text. Don't make detailed references to main text of report, or use terminology or symbols which could be confusing.
✘ *As shown on graph 4,* $\theta \propto 1/J$.
✓ *For a given applied torque, the angle of twist was found to be inversely proportional to the polar second moment of area of the bar.*

No new arguments should be presented in *Conclusions*. Arguments / discussion of data is done in an earlier section of the report.

Don't editorialise.
✘ *The experiment was generally successful.* (If your conclusions are complete, clear and accurate, then readers will be in a position to draw their own conclusion in this regard.)
✘ *The experiment was very interesting.*
✘ *The experiment was quite difficult.*

Avoid nonsense!
✘ ✘ *The main source of error was in obtaining the results.* (yes - I marked this)

And finally,
Are the conclusions complete? If appropriate, check back to the *Objectives* stated at the beginning of the report. Has the result of work relating to each objective been covered in the conclusions?