Experiment A1
Meter Stick Measurements
Procedure

Deliverables: Checked lab notebook, tech memo

Recommended Reading: Ch. 1 of *Undergraduate Lectures on Measurements and Data Analysis*

Overview

In this lab, you will each be given an official AME 20216 meter stick. The meter stick is the most basic scientific instrument, and you will use it to measure the height of the water tower. The overall goal of this lab is to show that a bit of ingenuity can greatly simplify a difficult measurement.

Part I: Height of the Water Tower

1. Use two of the meter sticks and Google maps satellite images to measure the height of the water tower by applying the concept of *similar triangles*. (Do not climb any buildings or fences!)
2. Sketch a schematic of your experimental method and record your measured values in your lab notebook.
3. Calculate the hydrostatic pressure in units of psi at the base of the water tower.
4. Do a bit of online research to determine the actual height of the water tower. (Be sure to cite the source in your tech memo.)

Deliverables – Using the format and style outlined on HW1, write a brief tech memo containing the following items.

1. A table containing the following.
    a. The height of the water tower you measured compared to the actual value (in feet). Be sure to include a citation for the actual value.
    b. Based on the height you measured, calculate the hydrostatic pressure (in psi) at the base of the water tower. Use the formula for hydrostatic pressure $p = \rho_w g h$, where $\rho_w = 1000$ kg/m^3 is the density of water, $g = 9.8$ m/s^2 is the acceleration due to gravity, and h is the height.
2. Create a simple schematic illustrating the technique you used to measure the height of the water tower. The drawing must be produced using computer software. (i.e. Power Point, Adobe Illustrator, Photoshop, etc.).

Suggested Talking Points

- Do a bit of research. What are water towers typically used for?
- How does the height of the water tower you measured compare with the actual value? If it does not agree, discuss potential ways to improve your measurement technique.
- As an engineer, what would you do to get water up to the top of the water tower?

Appendix A

Equipment

- Smart phone
- Laptop computer
- Official AME20216 meter stick