Pre Lab 4.1 – DA32435 – Dyab Asdi – 19305

TA: Mobina Tavangarifard

1)

Small can:

$D_1 = 3.007\ in,\ d_1 = 0.123\ in,\ H_1 = 4.315\ in$

$$A_{can,small} = \frac{\pi D_1^2}{4} = \frac{\pi (3.007\,in)^2}{4} \rightarrow A_{can,small} = 7.102\ in^2$$

$$A_{o,small} = \frac{\pi d_1^2}{4} = \frac{\pi (0.123\ in)^2}{4} \rightarrow A_{o,small} = 0.0119\ in^2$$

$$K_{o,ideal,small} = \frac{1}{\sqrt{1-\left(\frac{A_o}{A_{can}}\right)^2}} \rightarrow K_{o,ideal,small} = 1.0000013997045$$

$$K_{ideal,small} = K_{o,ideal,small} \cdot A_{o,small} \cdot \sqrt{\frac{2g}{A_{can,small}}}$$

$\hookrightarrow$ $K_{ideal,small} = 0.1239027$

Large Can:

$D_2 = 4.005\ in,\ d_2 = 0.249\ in,\ H_2 = 5.355\ in$

$$A_{can,large} = \frac{\pi D_2^2}{4} = \frac{\pi (4.005\,in)^2}{4} \rightarrow A_{can,large} = 12.598\ in^2$$

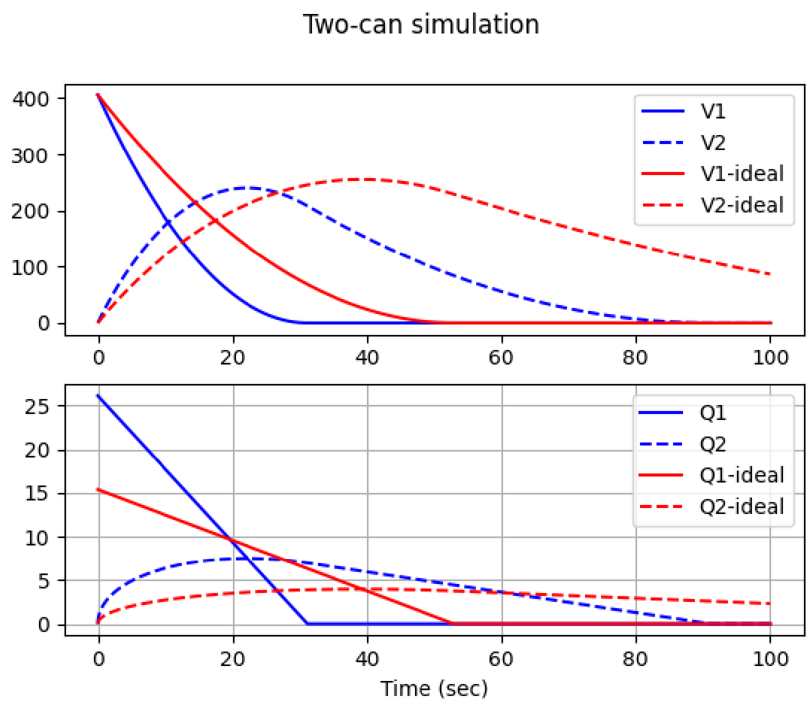
$$A_{o,large} = \frac{\pi d_2^2}{4} = \frac{\pi (0.249\ in)^2}{4} \rightarrow A_{o,large} = 0.049\ in^2$$

$$K_{o,ideal,large} = \frac{1}{\sqrt{1-\left(\frac{A_o}{A_{can}}\right)^2}} \rightarrow K_{o,ideal,large} = 1.000007471$$

$$K_{ideal,large} = K_{o,ideal,large} \cdot A_{o,large} \cdot \sqrt{\frac{2g}{A_{can,large}}}$$

$\hookrightarrow$ $K_{ideal,large} = 0.3812439$

2)



3)

Lab Procedure

1) Calculate the volume of the small and large cans
2) Fill a specific amount of water into the upper can and time how long it takes for all the water to get out of the can. Use this data to calculate the experimental K values to be used in the Python simulation.
3) Validate the accuracy of our simulation and ideal values
4) Make educated guesses for the initial volume value using the python simulation script to calculate in ideal situations, the maximum volume achieved in each of the cans
5) Continue to make guesses as you try and find the initial value where the volume reaches the maximum volume of each of the cans, but does not go over
6) Test in real life to see if the simulation results match the experimental results