# DLA Report 13

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29 March 2022

## 1 Summary

For this report I was able to resolve the problems identified during the previous time we ran the water table. I brought bricks from my house for the flow straighteners, glued the pipes together, and used silicone sealant to fix the leak for the stock tank. I then was able to run the water table again, but realized that the way I glued the pipes where the water comes out onto the table is now a literal water fountain.

## 2 Description of what was done

### 2.1 The Good (What Went Well)

I attached the hose adapters to the cut ends of the green hose right before the last group meeting, so I didn't put it in the report. After the meeting, we ran the water table and identified problems that needed to be fixed, which I have already resolved. One problem was that the water pressure from the table was too much for the aluminum honeycombs, so we needed to find heavy objects for them. I was able to take two bricks from my house to fix this issue. Another problem was the stock tank wasn't sealed properly, so I bought silicone sealant and sealed off those holes. The PVC pipes also broke apart, so I went ahead and glued them together. Furthermore, I raised the sluice gate since Mark mentioned that we should do that when both pumps are running. Lastly, I was able to set up the camera on the camera mount and have it successfully hooked up to a computer.

Figure 1: Stock Tank Filled with No Leaks. Note that there was minor leaking (slow water drops) from the pump pipes, but beakers contained the extent of the leaking.

I also had time to go back to the 2021 FSSS paper and continue trying to work with `fsolve` now that I had the function working in MATLAB. I was able to resolve my issue of properly inputting the function I was trying to optimize when solving for the surface height, but ran into a road-block with `fsolve` where it is asking for 250+ GB of RAM. This explains why the original paper implemented a custom Newton-Raphson solver, since that method was used to reduce memory usage.

## 2.2 The Bad (New Problem)

I ran the water table again and realized the way I glued the pipes together resulted in a surprise water fountain.

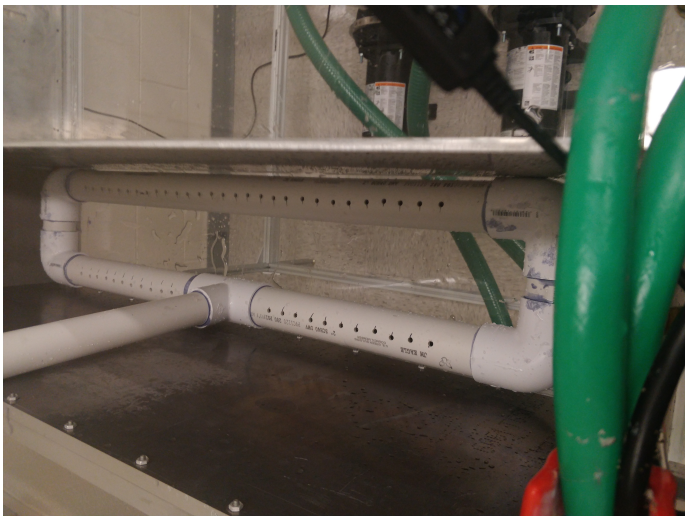

Figure 2: Pipe Orientation

The reason I glued the pipes like this was because it makes sense to me that in order for the water to come out of the sluice gate evenly that water would have to "fall" down and out of the gate. So, I oriented the holes in the pipes upward to ensure this is the case. I also assumed water in the tank above the holes would reduce the height of the water jets coming out of the pipes. If the holes would face downward I would expect that water would be pushed out of the sluice gate at different speeds. Regardless of the reason, water goes everywhere with what we currently have and there are several ideas I have as to how to fix this problem:

- The easiest solution would be to try to cut holes all around the pipe. This would reduce the pressure of the water coming out of the top holes of the pipe.
- Another solution would be to seal up the current holes (not sure how, maybe put screws in there? repair epoxy?) and drill new holes in the bottom of the pipe.
- The last-resort solution would be to throw out the problem pipes and build new ones ensuring the holes are in the right place.

# 3 Description of Next Steps

- Fix the current water fountain problem
- Continue setting up the water table (LED panel)
- Test for water table leaks

- Take images on the water table

# 4 Questions

- What do you think is the best solution for the water fountain problem?