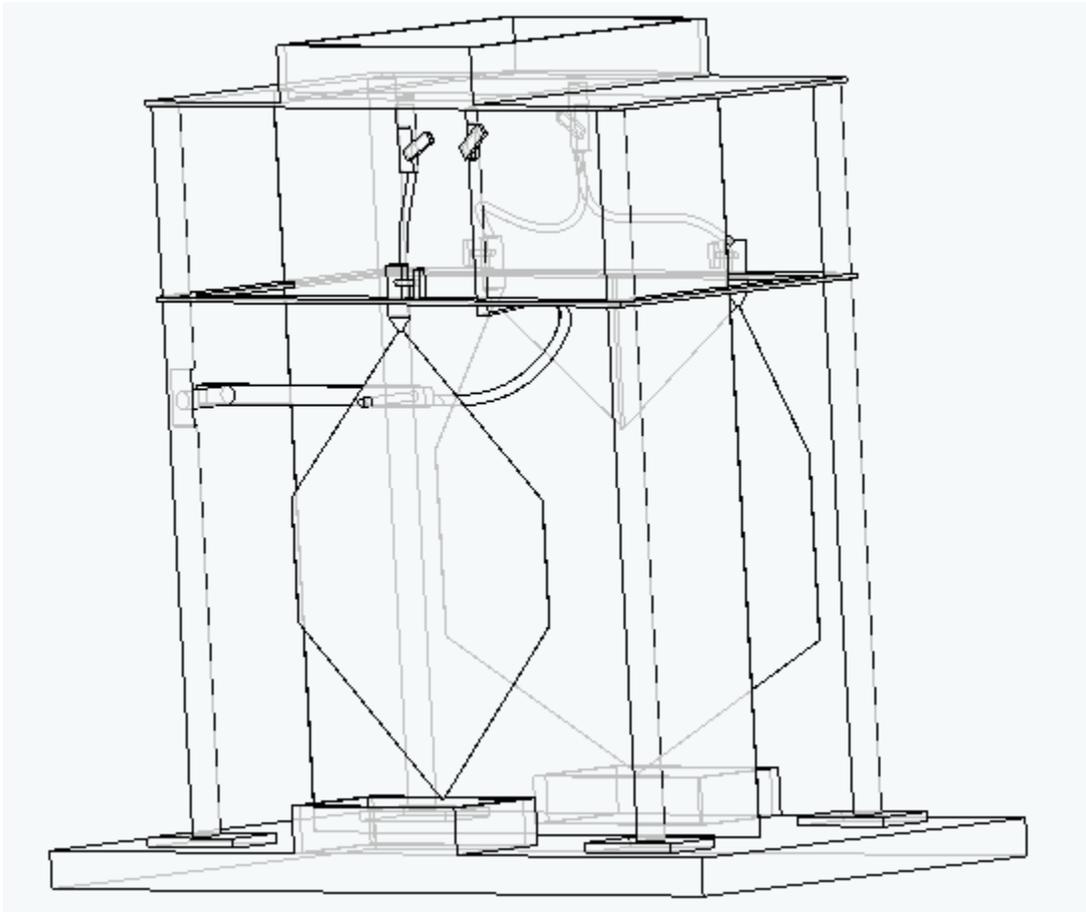
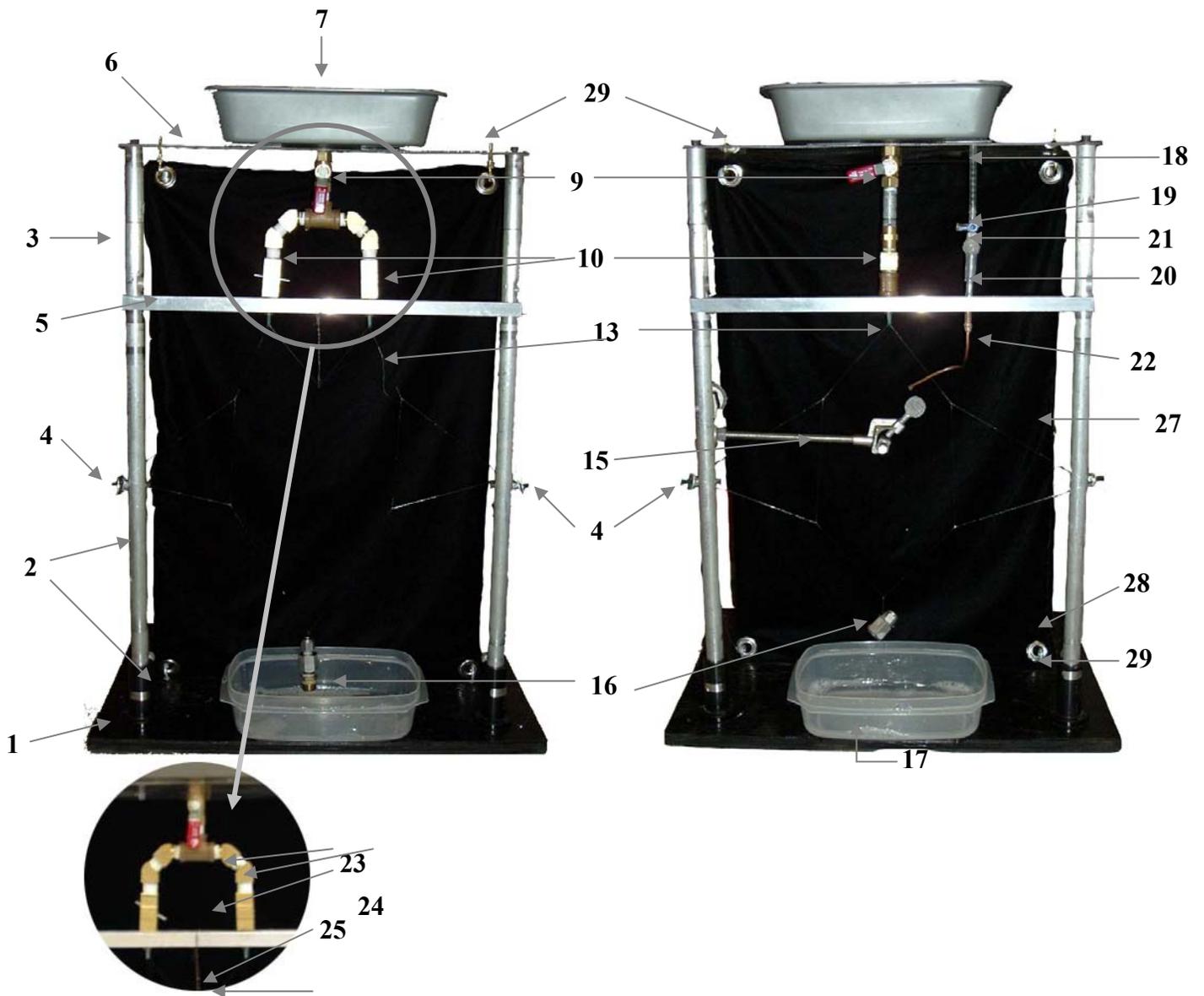


Soap Film Tunnel



User's Manual



- 1. Wood base (1)
- 2/3. Chem. stands (aluminum rods and bases) (4)
- 4. Handle screws (4)
- 5. C-shaped aluminum
- 6. Sheet of Acrylic (1)
- 7. Top reservoir (1)
- 8. Brass pipe connectors (3)
- 9. ¼-turn shut-off valves (2)
- 10. Needle valves (3)
- 11. Decreasing pipe (3)
- 12. Plastic funnel (3)
- 13/26. Nylon wires
- 14. Pull strings
- 15. Chem. stand arm (1)

- 16. Weights (2)
- 17. Bottom reservoir (2)
- 18. Syringe (1)
- 19. 3-way valve (1)
- 20. Plastic tube
- 21. Hot glue (swivel joint)
- 22. Copper pipe
- 23. Brass-tee (1)
- 24. 45° connectors (4)
- 25. Steel wire
- 27. Velvet
- 28. Grommets (4)
- 29. Metal hooks (4)
- PTFE thread seal tape

Preparing the Solution

Mix one gallon of water with a quarter cup of dishwashing liquid. May be used immediately, or can be stored in a closed container. Always mix solution before using. Excess solution that ends up in the bottom reservoir may be re-used if it is still clean, otherwise it can be disposed of in the sink or drain. When not in use, always keep the solution stored in a closed container at room temperature.

Setting Up

1. Make sure that the two shut-off valves (red valves) and the small blue valve are all closed before pouring the solution.
2. Fill the top reservoir (#7) about half way with the soap solution. Make sure you have plenty of extra solution in case you run out during the middle of an experiment.
3. Make sure that the bottom reservoirs (#17) are in place, sitting on top of the plexi-glass platforms on the base.
4. Set up your camera on a tri-pod in front of the apparatus.
5. Follow the instructions listed below for the appropriate experiment that you would like to run.

Wake Flow

CAUTION: DO NOT adjust the needle valve unless instructed to do so. Misuse may cause for the film not to form.

1. Make sure that the two nylon wires (#13) are hanging down freely, if not, unhook the strings from the side screws (#4).
2. Check to see that there is a weight (#16) securely connected to the bottom of the nylon wires.
3. Turn the red shut-off valve (#9) on.
4. Allow the solution to drip to the bottom of the wires before pulling them apart.
5. Slowly pull the two strings, so that the wires are pulled apart from one another. Hook the strings to the screws on the side of the frame.
6. Quickly position the arm (#15) behind the film for where you want the object to insert into the film. (You can move the arm along the side frame by loosening the large screw. You may also move the horizontal arm closer or farther from the center by unscrewing the two nuts around the end of the rod.)
7. To insert your object into the film, first wet it by soaking it in the solution in the top reservoir. Then place it in the arm and tighten it in place. (The arm and/or object may be moved around while in the film as long as the object is wet).
8. If you run out of solution, you can pour more into the top, or you can empty the bottom reservoir into the top one if you have something to catch the drippings at the bottom.
9. If the film breaks, remove your object so that it is no longer protruding the film and unhook the strings from the sides. Then repeat steps 4-7.
10. Follow the clean up instructions below when you are finished with the apparatus.

Jet Flow

CAUTION: DO NOT adjust the needle valve unless instructed to do so. Misuse may cause for the film not to form.

1. Make sure that the two nylon wires (#13) are hanging down freely; if not, unhook the strings from the side screws (#4).
2. Check to see that there is a weight (#16) securely connected to the bottom of the nylon wires.
3. Swivel the copper tube so that it is not protruding the film by grabbing the swivel joint (#21).
4. Turn the red shut-off valve (#9) on.
5. Allow the solution to drip to the bottom of the wires before pulling them apart.
6. Slowly pull the two strings, so that the wires are pulled apart from one another. Hook the strings to the screws on the side of the frame.
7. Wet the tip of the copper tube for the jet flow (#22) with your fingers, being careful not to disturb the film. Then rotate it, by grabbing the swivel joint, so that just the tip of the tube is touching the surface of the film.
8. Turn the blue valve (#19) on so that it is pointing to the left. This should form a jet flow through the film.
9. If you run out of solution, you can pour more into the top, or you can empty the bottom reservoir into the top one if you have something to catch the drippings at the bottom.
10. If the film breaks, rotate the copper tube back a few centimeters so that it is no longer protruding the film and unhook the strings from the sides. Then repeat steps 5-8.
11. Follow the clean up instructions below when you are finished with the apparatus.

Shear Flow

CAUTION: DO NOT adjust the needle valves unless instructed to do so. Misuse may cause for the film not to form.

1. Make sure that the two nylon wires (#13) are hanging down freely, if not, unhook the strings from the side screws (#4).
2. Check to see that there is a weight (#16) securely connected to the bottom of the nylon wires.
3. Crisscross the two nylon wires, hooking on of them on the front hook and one on the back hook (#25).
4. Turn the red shut-off valve (#9) on.
5. Allow the solution to drip to the bottom of the wires before pulling them apart.
6. To unhook the wires, carefully pull the strings away from the hooks at an upward angle. Then, carefully un-cross the wires and pull them apart and hook the strings onto the screws on the side.
7. Observe the two different rate flows at the top of the film and then observe the two flows interacting in the lower half.
8. If you run out of solution, you can pour more into the top, or you can empty the bottom reservoir into the top one if you have something to catch the drippings at the bottom.
9. If the film breaks, unhook the strings from the sides. Then repeat steps 3-6.
10. Follow the clean up instructions below when you are finished with the apparatus.

Clean Up

1. Unhook the strings from the sides so that the nylon wires hang freely.
2. Keep the red shut-off valves turned on and make that both weights are hanging over the bottom reservoirs.
3. Use a syringe to suck out the extra solution from the top reservoir and put it back into the container that it is stored in.
4. Pour all of the extra solution from the bottom reservoirs into the storage container (if the solution in the bottom reservoirs are dirty with a lot of debris and dirt, then dispose of it down the drain).
5. Make sure the storage container is closed tightly and stored in a safe place at room temperature.
6. Fill half of a bottom reservoir full of water and pour it into the top reservoir and let the water drip through all of the valves.
7. Suck any excess water out with a syringe and dry the top reservoir with a towel.
8. Close all of the shut-off valves and clean and dry the bottom reservoirs.
9. Wipe up any mess that was spilled on the floor.