15.4.3: Hydrodynamics

Testing Bernoulli's Principle

Use the "Flow" tab to verify Bernoulli's Principle.

$$P_1+\frac{1}{2}\rho v_1^2+\rho g h_1=P_2+\frac{1}{2}\rho v_2^2+\rho g h_2 \tag{15.4.3.1}$$

1. Raise one end of the pipe so that $h_1 \neq h_2$. This will result in $P_1 \neq P_2$.
   a. Use the pressure gauge to measure pressures P at both ends of the pipe.
   b. Do the changes support Bernoulli's Principle? Explain.
2. Reset the simulation.
3. Make one end of the pipe smaller than the other while keeping the center of the pipe at the same height. How does this change P and v on each end of the pipe?
   a. Use the pressure gauge to measure pressures P at both ends of the pipe.
   b. Do the changes support Bernoulli's Principle? Explain.

Testing the water tower

Click on the "Water Tower" tab. Fill the water tower and click the button to "Match Leakage".

We saw that the speed of the water leaving the water tower should be $v_2=\sqrt{2 g h_1}$. Verify this occurs in the simulation by opening the valve at the bottom of the tower and measuring the speed of the water.

Next, change the "Match Leakage" back to manual. Observe the speed of the water leaving the water tower. Explain your observations in terms of Bernoulli's Principle.