

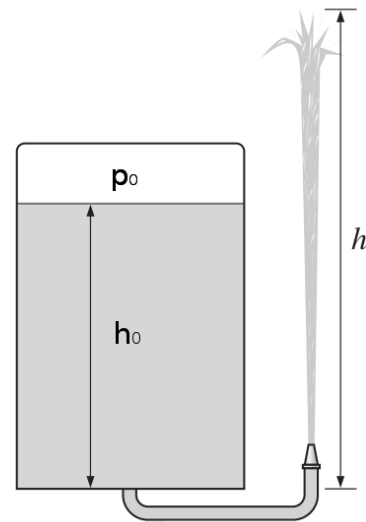
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Fluid dynamics

Problem 1 (11 points)

The water surface in a tank at a level h_0 above the bottom of the tank. A hose is connected to the bottom of the tank and the nozzle at the end of the hose is pointed straight up. The tank cover is airtight and the air pressure (relative to the atmospheric pressure) above the water surface is p_0 . Determine the maximum height h to which the water stream could rise.

Assumptions: the flow is steady, incompressible (with density ρ) and frictional effects are negligible, so that the Bernoulli equation is applicable.



Theoretical question 1 (11 points)

Prove Buckingham's (II) theorem and show an application of it.

Theoretical question 2 (10 points)

Derive the equations that govern an irrotational flow and discuss when such a flow can occur in practice.