

# Paraphrasing report

[Health & Medicine](#), [Stress](#)



## **Verification of Bernoulli's Equation**

Bernoulli's Equation is among the most crucial equations in fluid mechanics. The experiment led us to conclude that this equation is an example of the initial law of Thermodynamics. In addition, the experiment verified the application of the equation to the steady state flow of an inviscid and incompressible fluid. As the fluid flows in a pipe, the changes in pressure, velocity, and elevation should be consistent in order to satisfy the equation. The restrictions in the application of Bernoulli's Equation include a steady flow, negligible friction losses, and constant density. Our calculations also verified Bernoulli's Equation since  $E_1 + E_3 + E_5$  was approximately equal to  $E_1 + E_3 + E_5$ , and thus  $TE_1$  was approximately equal to  $TE_2$ . After finishing the experiment, we established that a decrease in area leads to an increase in the velocity.

## **Determination of Friction Loss in a Straight Pipe**

Friction loss refers to the energy loss, which takes place in the pipe flow, as a result, of the viscous effects created by the pipe surface. The loss is essentially deemed as a “major loss” and individuals must not confuse it with “minor loss” that comprises the loss of energy, as a result, of obstructions. Within the mechanical systems, friction loss is essentially the power that is lost while overcoming the friction between the two services that are moving. The energy fall depends on the wall shear stress ( $T$ ) between the surface of the pipe and fluid. In addition, the flow shear stress depends on if the flow is laminar or turbulent.

The pressure fall depends on the surface roughness for turbulent flow, but in

the laminar flow, the effects of roughness on the wall of the pipe are negligible since there exists no viscous layer in the laminar flow. On the other hand, in the turbulent flow, a thin viscous layer is created near the surface of the pipe, and this layer causes energy loss. We established that the calculated head- loss was not equal to the measured one due to the existence of the percentage error, which resulted from truncation, instrumental, and human errors. We calculated errors as shown below

$$\% \text{ error (1)} = 0.165/0.414 = 39.8\%, \text{ and}$$
$$\% \text{ error (2)} = 0.235/0.599 = 42.2\%.$$

After studying the friction loss, we found that the skin friction takes place, as a result, of the obstructions in the line of flow while form friction occurs due to the friction within the surface of the tube. In addition, our calculations demonstrated that  $Re > 4000$  proving it to be turbulent. Conclusively, an increase in  $Re$  leads to a rise in head loss. Moreover, a rise in the fluid velocity increases volume flow rate.